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NO. 1 VOL. 1

UNITED STATES NAVAL
MEDICAL BULLETIN

FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY PART OF THE WORLD, AND PERTAINING TO THE PHYSICAL WELFARE OF THE NAVAL PERSONNEL

APRIL, 1907

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1907

NAVY DEPARTMENT,

Washington, March 20, 1907.

This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,

Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, advanced therapeutics, surgery, medical department organization for battle, new methods of treatment, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. Rixey,
Surgeon-General U. S. Navy.

SPECIAL ARTICLES.

GROSS PATHOLOGY OF SAMOA, WITH COMMENTS UPON SANITARY FEATURES AND TREATMENT.

By Passed Asst. Surg. A. M. FAUNTLEROY, U. S. Navy.

The Samoan, though usually very intelligent, is superstitious to a degree, and the native "doctors," who are generally "devil doctors" also, are not slow in making use of this weakness by claiming that various ailments are due to certain kinds of "devils" which they will proceed to extract for a certain sum of money. The mode of procedure is to place bits of a certain leaf, which have usually been chewed by the "devil doctor," over the area where the "devil" is said to be and also over the closed eyes, into the nostrils, and into the ears. After a certain length of time, which is accompanied by much mumbling and praying, the "devil" is supposed to make its exit and the fact is generally communicated to the suffering patient by the "doctor," who describes minutely the personal characteristics of the particular form of "devil."

This has been the indirect cause of not a few deaths among the natives, as it prevents their being brought promptly to the native hospital, where in some cases their lives could have been saved. The practice, however, is slowly dying out and it is to be hoped that before long it will have entirely passed away.

Elephantiasis of some portion of the body is very common. It affects noticeably about 50 per cent of the males after puberty and about 20 per cent of the females. The natives state that it is far less common now than in former years, when scarcely a male escaped. This is no doubt due in great measure to the widespread adoption of the mosquito net in practically every house and a more salubrious condition of the villages.

The legs, arms, thighs, scrotum, mammæ, and vulvæ are the parts affected, named in the order of frequency; and although it is usual in long-standing cases to find several parts of the body affected, it is not unusual to find the scrotum apparently the only part of the body involved. The earliest age at which I have noticed the disease is 18 years for both sexes.

The disease does not seem to affect the usefulness of the individual or have any marked influence upon the general health other than the

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periodical attacks of elephantoid fever. They can move their ponderous limbs with considerable agility, considering the deformity, and when the scrotum is the seat of the disease they rarely present themselves for operation until the penis is almost obliterated and copulation all but impossible. The foot is always affected with the leg; but in case the forearm is affected the natives have a way of constricting the wrist with a leather strap or piece of cloth which prevents the hand from sharing in the enlargement.

Operations on limbs for the removal of a limited area of elephantoid tissue are not a success, as it quickly reappears and the limb is often worse off than before, since it is not unusual for keloid-like growths to appear in the scar, and, in addition, the latter very frequently breaks down.

The so-called "varicose groin glands" are very prevalent, but the conditions known as *chyluria* and *lymph scrotum* have been noticed rather infrequently.

The elephantoid fever is ushered in with a sharp and prolonged rigor, while the body temperature is usually around 104° F. Severe headache, and pain and warmth in the affected part are marked symptoms, while anorexia, nausea, and restlessness complete the febrile picture. This lasts usually from two and a half to three days and is accompanied by intervals of exhausting sweats. During an attack the affected limb or part enlarges and the skin becomes tense, shiny, red, and very sensitive to pressure. The native name for this phase of the disease is "mu mu." After an attack the swelling of the skin subsides somewhat, but there is always an increment of gain. The attacks of elephantoid fever are considerably influenced by the habits of the patient. Exposure to dampness has a marked influence in bringing on an attack, and, in a lesser degree, prolonged exposure to the sun. Leucocytosis is present during an attack, and there is a marked increase in the number of eosinophiles and small mononuclears.

The natives treat the affected part by poulticing with the leaf of a shrub, which certainly seems to relieve the pain and, according to them, shorten the attack. The shrub from which the leaf is obtained and its mode of preparation is supposed to be a secret which is passed along from one individual to another.

The ice bag applied to the affected part is very soothing and, when combined with elevation and rest, is believed to be the most efficacious treatment. Codeina, phenacetin, and caffein relieve the head promptly. Bandaging the affected limb after an attack is of doubtful value from a practical standpoint, as a native has to make his living, which consists principally of climbing cocoanut trees for the copra that is dried from the nut, and for this reason and others will not wear the bandage continuously.

For the initial lymphangitis an ichthyol ointment compress to the affected part has proved very beneficial, often relieving the acute symptoms in a few hours.

The blood worm, as far as a limited study has revealed, is the filaria nocturna, which can easily be obtained from the finger blood in a large percentage of natives when the blood is taken about 9 p. m. The technique is very simple and practically the same as for the malarial parasite. In an examination of 67 healthy males between 25 and 30 years of age I found the blood fluke in 17.

That the mosquito is not the *Anopheles maculipennis* or the *Stegomyia fasciata* is certain, and it does not correspond in several important details with the description of any of the better known species of the genus *Culex*. That it is a subspecies of the genus is believed to be the case, and it has been said to be the *Culex fatigans*. However that may be, it seems the only variety in, at least, American Samoa, as the mosquitoes of nearly every village have been closely scrutinized in vain to determine the presence of other species or varieties.

A careful observation of practically every native of American Samoa, and a great many of German Samoa, has been made with a view to ascertaining the presence of syphilis, and it is confidently believed that syphilis does not exist among the Samoans. Several suspicious cases were observed, but on closer inspection turned out to be something else.

Gonorrhea is present to a limited extent, both of the urinary apparatus and the eye. Rigid measures have been adopted to stamp this disease out, such as promptly quarantining the patient, who is then systematically treated until well.

As regards diseases of the chest, pneumonia of a bronchial type, pleurisy, and tuberculosis are very common. The natives have the bad habit of spitting indiscriminately in their houses. The floors of the latter are composed of small pieces of coral rock covered in part with mats, and the native custom when expectorating is to lift up the corner of a mat and deposit the sputum on the small rocks beneath. An effort has been made to show them the evil of this practice and some little has been accomplished, but it is a habit early acquired and very hard to break.

Bronchial catarrh and bronchitis, acute and chronic, are very common. Bronchiectasis and a condition resembling asthma are not uncommon in middle and old age.

One case of organic heart lesion, a mitral incompetency, was noted during the year.

Of diseases of the abdominal organs, diarrhea is common, especially among children; while dysentery is met with rather infrequently, although it is usually of a severe type when it does occur.

Laudanum and large doses of powdered ipecac, with a turpentine stupe applied to the abdomen, have proved very successful in reducing the number of bloody evacuations, relieving the tenesmus and eventually effecting a cure. One death in ten cases is the record for the year. While these cases were under observation there was no microscope to determine the specific cause, but it is suspected that the disease is a bacillic type.

Abscess of the liver has been suspected several times. One case died in which an autopsy could not be obtained and one case recovered under symptomatic and expectant treatment.

Intestinal obstruction is of not infrequent occurrence, but it is usually three or four days before they are brought to the hospital, and then it is too late for operative interference to accomplish anything.

Appendicitis is by no means rare. The majority of cases seen have been of a chronic type, although acute cases occasionally present themselves.

But one case of organic disease of the stomach has been noted for the year, and this, at operation, was thought to be carcinoma.

Inguinal hernias occur in about the same proportion as among white people, and the results of radical operation are very satisfactory.

Of the intestinal parasites the lumbricoid worm is the only one which has been observed. It is by no means the pest as in other tropical climes and is confined almost entirely to small children. A plentiful supply of pure drinking water is doubtless responsible for the comparatively scarcity of these flukes. The probability of the existence of other nematodes, and possibly trematodes, is not to be denied, although clinical evidence of their presence is lacking. The microscope arrived too late in the year to enter upon a systematic search for these organisms.

That trichinosis apparently does not figure in the pathology of these islands is remarkable in view of the fact that the pig is the principal article of meat diet in the South Sea islands, and is often served in a half-roasted condition.

A careful search for clinical evidence of the hook worm has been negative, and, although in years gone by it is said to have existed, nothing to indicate ankylostomiasis has been observed during the past year.

Ovarian tumors are comparatively frequent, but operative measures are not consented to by the native until the tumor has become so large as to be burdensome. Painful and profuse menstruation is a common complaint, and the percentage of miscarriages is high.

Diseases of the eye are limited to specific ophthalmia, conjunctivitis,

pterygium, staphyloma, and ulcer. The latter is responsible for not a few cases of blindness among the natives.

Diseases of the ear are very uncommon and in the few cases of otic disorder which have been observed the removal of foreign bodies, such as small rocks, insects, or inspissated wax, has resulted in a speedy cure.

A few cases of polypi of the nose have been seen, but with the exception of a manifestation of yaws just inside the external nares, this organ is also comparatively free from disease.

The mouth and throat are frequently affected, the former principally as the result of carious teeth and the latter with tonsilitis and pharyngitis. But few natives pay any attention to their teeth, except to have them pulled when aching, and as a result their mouths are usually in a very deplorable state when advanced age is reached.

Skin affections play an important part in Samoan pathology, as every native sooner or later falls a victim to one or more; in fact, it is safe to say that there is not one over a year old whose skin is not noticeably affected in one way or another. Among the most conspicuous are the ringworms, tinea circinata, and imbricata. *T. circinata*, among the Samoans, well deserves the name of "eczema marginatum," for it is by no means uncommon to see large areas of burnished skin surrounded by a border of inflamed, crustaceous, scaling nodules which often become pustular. Chrysarobin ointment acts well, but unfortunately this medicament sets up an exzematous condition of its own, and its application can not, therefore, be long continued.

The most common skin disease among the Samoans is an affection which closely resembles the white variety of Pinta in many ways. The natives call the disease "tane." The skin of the entire body may be affected with the exception of the palms of the hands and the soles of the feet and scalp. According to the accepted description of Pinta, the scalp is sometimes affected, causing the hair to turn white and fall out. It may be that the reason this does not occur among the Samoans is because of the native habit of putting lime paste on the hair about once a week to kill the head lice. The skin of the trunk, neck, and arms are the most common sites, although the forearms, legs, and thighs are by no means immune. It seems to avoid the crutch and axilla.

Like Pinta, it commences at one or two points as small, usually rounded or oval, isolated patches. These latter may coalesce to form a larger patch of irregular shape, sometimes as large as the palms of both hands. Once the disease starts it spreads with great rapidity, and in untreated cases it is not unusual to find the skin of the major portion of the body affected. The peculiar feature of this disease is the disturbance of the natural pigment of the skin, causing the forma-

tion within the patches of a grayish-white discoloration, which shows up very plainly on the brown skin of the Samoan. Ragged areas of sound skin are to be found between the patches, so that after the disease is well established it gives the skin a peculiar mottled or piebald appearance. An exceedingly fine desquamation occurs over the affected area, and the skin involved itches intensely, particularly when the atmosphere is damp. The natives claim that the itching is more severe after a bath in salt water and that after such a bath the margins of the areas are very slightly raised above the level of the adjacent healthy skin, a fact which I have verified.

On examining these patches with a hand lens it is seen that along the edges are a goodly number of very small vesicles, which now and then can be seen with the naked eye. If one of these is punctured with a needle, a droplet of colorless serum-like fluid exudes. If the scrapings at the edge of a patch be moistened with a drop of liquor potassa and placed under the microscope, a large number of small colorless spores are seen and now and then a delicate reticulum of a slightly branching mycelium. The fine desquamation is explained by the drying up of the minute vesicles at the edge of the patch and consequent exfoliation of the epithelium forming the top of the vesicle.

The progressive leucoderma-like discoloration of the skin and the itching are constant features of this disease. All ages of both sexes are affected, and the disease is not accompanied by any constitutional disturbance, however extensive the areas of skin involved. It is exceedingly rare to find a native whose skin is not affected to some extent by this disease, and it has been noticed that in the rare instances of its absence the native has invariably adopted European methods of dressing and living. The vast majority of Samoans, though bathing usually several times a day, will return to their houses and lie around on the floor mats, which are constantly being walked upon, and thus accumulating, along with other dirt, the fungus which causes the disease. Very few Samoans when in their houses wear other than the simple "lava-lava," or loin cloth, so that almost all parts of their bodies come in contact with whatever infection there is on the mats. Outside of their houses the males wear only the "lava-lava," while the females wear, in addition, a short tunic-like affair which reaches to the waist and is generally without sleeves.

The discoloration of the skin persists for a long time after the disease has apparently left a particular spot, but the natives state that after several years the natural hue of the skin will be restored.

The proportion of 1 gram of salicylic acid to 50 c. c. of alcohol anointed on the body, preceded by a soap bath, has been found to be the most efficacious treatment. Iodine ointment can be applied with good effect to the margins of small patches; but the disease is

usually so extensive that, unless a remedy is used in which the body and limbs can, practically, be bathed, good results are not obtained, as it is very easy to overlook small areas.

Frombœsia, or yaws, is also a very common disease among Samoans, particularly at an early age. It is so common, indeed, that the Samoan parent looks for its appearance in the child and is disappointed when it does not occur while the child is young, for they recognize the disease as inevitable and realize that one attack is protective and wish to have it over with before the child grows up. A significant fact, to be discussed later on, is that, while a large percentage of half-caste children suffer the disease, those whose families have adopted a strictly European manner of living rarely contract it, which is also the case with white children.

There are several facts in this connection which direct attention to the fly. Samoans, whose name for the disease is "tona," associate it with the advent of the bread-fruit season, which begins about the middle of November, and it is interesting as an etiologic speculation that the bread-fruit season is always accompanied by an enormous increase in the number of flies around Samoan houses. Shortly after the opening of this season "tona" becomes very prevalent among the children. The Samoan takes absolutely no precaution against fly infection. Their food is spread out on the floor of their house and the flies swarm over it, as well as over their bodies, and they do not seem to pay any attention to their presence other than an occasional sweep of the hand to drive them away from the particular piece of food they wish to eat. They are equally callous of the fly's presence about their persons and appear to be but slightly sensitive to its contact with their skin. It is also held to be beneath the dignity of a Samoan to kill a fly.

The result of all this is that the fly is a very "bold animal" around a Samoan house, while such is not the case around the houses of the whites and the better class of half-castes, as precautions are taken to prevent the ingress of flies and the character and service of food offer very little attraction to the fly in comparison with the large chunks of overripe, sweet breadfruit and other food spread out on the floor of the Samoan house in profusion. Furthermore, white people and the better class of half-castes are very sensitive to the fly and do not tolerate its presence, and they are invariably clad in a way that leaves but a very small portion of their skin exposed to possible infection by the fly. The Samoan is just the reverse, and his scantily covered body offers every opportunity for the deposit of whatever the fly has in its possession. The babies and very young children rarely if ever have any clothes on at all, or at best a narrow strip of cloth—most often a mere string—tied around their loins. It can be readily seen that if small wounds or abrasions are present in

the skin of the child, and such is usually the case, the fly, which, as indicated, is present in large numbers, will surely come in contact with some of them and communicate whatever contagium it has gathered in its wanderings. The small sores, wounds, and abrasions of a Samoan child are never cared for or protected, nor is any attention paid to the yaw sores which may be scattered all over the child's body and are exposed to the visitation of flies at all times of the day.

That the disease is contagious is beyond question. That the contagium exists in the granulomatous, fungoid yaw sore has also been proven by inoculation experiments. That the fly has every opportunity for disseminating this contagium by carrying it from the yaw sore to an abrasion in the skin of another child or person is also certain, at least for Samoa and doubtless among natives of all tropical climes. In view of its epidemic manifestations, that some such means of conveying the contagium as offered by the fly does exist is obvious, since body contact can account for only a small percentage of the large number of cases that have come under the writer's observation. Indeed, immediate contact with other cases of yaws, or yaw-infected fomites, could almost with certainty be excluded. That the evidence is strongly condemnatory of the fly as a disseminator of this disease over other insect or animal conveyance is also apparent, since no other enjoys such privileges as the native tropical house fly or offers equal means to the quick house-to-house dissemination of the disease. The disease, though present to a noticeable extent the year round, becomes epidemic during the fly season, and then, with the departure of most of the flies, suddenly ceases its epidemic form and dwindles down to a few cases here and there. Every considerable fact in the premises points unerringly to the fly as, by long odds, the principal disseminator or medium by means of which the disease is conveyed.

To push the ætiology a point further, it is a reasonable assumption, in view of the incubative period and the usual constitutional disturbance, together with the immunity conferred by one attack, to regard yaws as one of the infectious diseases to be placed in the same category, though of a much less virulent character, either with yellow fever or the exanthemata, the immediate causes of which are not yet known, though the mediums by means of which their causes are spread have been well established.

That it is possible there may be other avenues of infection than the abraded skin must not be lost sight of, and the gastro-intestinal as well as the respiratory mucous membrane is to be excluded beyond a reasonable doubt if the chain of evidence to incriminate the fly is to be made complete. To entirely exclude the gastro-intestinal mucous membrane as an avenue of infection presents some difficulty, in that the fly, in common with other means of inoculation, may con-

taminate the food, which, acting as a fertile culture medium, might then convey the contagium to a receptive gastro-intestinal mucous membrane and thence to the general system by absorption. At first glance this assumption may appear tenable, but if such were the case no child would escape an attack at an early age. It sometimes happens that the mother's body is covered with the yaw, which affords ample opportunity for mouth infection, and yet the child escapes, at least for a considerable time. Again, later on, its food is frequently prepared and handled by hands on which the yaw is also present and still the child escapes. On the other hand, it would seem that the skin-abrasion theory could be combated by the same reasoning, in view of the child's escape despite the intimate contact which often occurs between it and the yaw-infected mother or small nurse girl. Such an argument if advanced would be deceptive, and it may be answered that while infection between mother or nurse and child does no doubt occur by contact in certain cases, the child frequently escapes because there may be no abraded skin in such a position as to be brought into intimate contact with the yaw of mother or nurse girl. But it is well known that the fly in its ever active quest for food discriminatingly seeks out an open sore or abraded surface, thus lodging the contagium it carries on proboscis and legs in a field more surely vulnerable and favorable to its growth. It is common observation to see the yaw develop in a preexisting sore or ulcer.

In no other way can the epidemic character of the disease be explained, as yaws is endemic throughout Samoa, which means that the same conditions for its dissemination, with the exception of the fly, are present all the year round. The endemicy is due primarily to the favorable tropical conditions, such as heat and moisture, which keep the contagium alive, and the small number of cases which occur out of fly season can be regarded as the extent to which personal contact with the infection figures in the ætiology.

That it is not a disease in which overcrowding plays a part would seem to exclude the respiratory mucous membrane as an avenue of infection. In this connection it is noted that in several of the Samoan missionary schools, in which children of all ages are gathered together and overcrowding is apparent, but in which children are well clothed and the other sanitary conditions are good, the "tona," or yaw, is of rare occurrence and may be said not to occur at all unless the child resumes native conditions.

These facts and arguments in favor of the fly as the principal means of conveying the disease, at least for Samoa, are set forth in view of the noticeable lack of reference to the fly by tropical sanitarians in their writings on the subject. Some writers do not allude to the fly at all, while others, notably Nicholls, mention it, along with

other insects, as a probable means of conveyance, but attribute the vast majority of cases to the influence of personal contact with the yaw sore or yaw-infected fomites. Nicholls mentions a micrococcus, which occurs in the granulomatous yaw in large numbers surrounded by granulation cells, as the probable specific cause of the disease, but sufficient evidence to warrant our full acceptance of it is wanting.

Yaws is a disease to be reckoned with in the Tropics, as its incapacitating effect when the palms of the hands and the soles of the feet are affected is very noticeable and is ofttimes of economic importance among planters, not to speak of the wholesale sickness which it causes among children. An ulcer of the foot, ankle, or hand of yaw origin is of common occurrence and sometimes is so extensive as to result in permanent disability, such as the loss of all the toes and, in one case observed, part of the foot. Its economic importance in most tropical countries makes it an urgent matter that the means of dissemination be carefully sought out and appropriate methods taken to check its progress with a view to its ultimate extermination.

If in a particular tropical country the fly is found to be the principal means of conveying the disease, as appears certainly to be the case in Samoa, prophylactic measures should be adopted to the end not only that the fly be excluded as far as practicable from native houses, but that all abrasions, sores, and particularly the yaw be protected from their attacks. In case the yaw is extensive over the body surface, some form of clothing should be worn over the entire body that will adequately protect all affected parts. For the very young a closed gown which can be drawn on feet first and snugly purse-stringed around the neck and limbs is recommended. When yaws appears on the face and neck it is best to touch with copper sulphate and protect with a mildly antiseptic ointment.

To exclude the fly from the Samoan house is a difficult task at best, but a good deal can be accomplished by constructing a wire or wooden frame covered with mosquito netting and placed over the food that is served on the floor of the house. This is a cheap and simple method of making the Samoan house less attractive to the fly. It can not be expected that the Samoan people will change their manner of living for the sake of the fly, with whom they have lived for many hundred years, but something is expected from trying to teach them to abhor the fly, which may be also responsible for several other diseases, as they have already learned to abhor the mosquito.

Tonic and hygienic treatment along broad lines should be adopted. With the very young little internal medication is necessary beyond keeping the bowels open and free from worms. The mother should be encouraged to bathe the child frequently in addition to protecting all sores and abrasions against the fly. After the granulomatous yaw

has formed, touching daily with copper sulphate, followed by the application of a mildly antiseptic ointment, is recommended. With older children, generally in addition to the local treatment, the exhibition of iron or arsenic is indicated. With grown people potassium iodide in ascending doses acts well, particularly as regards the large ulcers which sometimes form from the yaw. Mercury is a capricious drug in the Tropics, in view of its accentuated liability to cause salivation, and is not recommended as routine treatment, as, even when favorably received by the patient, it offers no advantage over the iodide of potash. If used at all, it should be cautiously administered and the effect carefully watched. The salt-water bath has a very wholesome tonic effect upon the skin, favors the efflorescence of the disease, and consequently shortens the attack.

Before leaving this subject it might be well to add a few words in connection with yaws, syphilis, and the destructive tropical rhinopharyngitis which is prevalent among certain tropical islands, notably Guam. It has been said that these three are closely identified, and there are those who have said that yaws is syphilis modified by tropical surroundings.

Reports from Guam indicate that the rhinopharyngitis endemic there has been considered at various times a manifestation of yaws, syphilis, tuberculosis, or leprosy. Without need of going into the differential diagnosis of these diseases, which has been so well done by Leys and others, it can be said in further support of their distinctiveness that, while Samoa is a group of tropical islands in which yaws is endemic and at times epidemic, syphilis and leprosy are unknown, and, in the writer's experience, rhinopharyngitis or the slightest trace of its earlier presence has not been seen.

Mycetoma, or fungus foot, of the white variety, has been identified twice during the past year. One case in which the foot and ankle were affected and one in which the disease occurred at the junction of the wrist and the palm of the hand. The first case was that of a woman 25 years old, with involvement of the inner side of the left foot and the ankle, of three years' standing. The skin of the affected area was removed, the cicatrical mass dissected out, and all cavities and sinuses obliterated. The woman was discharged apparently cured in three months, but has lately presented herself with a recurrence of the disease on the outer side of the ankle and foot. In the case of wrist involvement thorough excision was practiced. The patient was a man of about 25 years, and was discharged in three weeks apparently cured.

Ulcers are plentiful, usually as the result of scratching the tinea and from yaws. Some of these, as indicated, attain to large destructive sores and are to be energetically dealt with. Boils and abscesses

are common, but respond well to evacuative and antiseptic treatment.

Lipomata are very common, the most usual sites being the posterior aspect of the shoulder and the lumbar region; rarely the midaxillary region and the posterior aspect of the knee. They do not attain to a great size, the largest removed weighing 8 pounds, but there seems to be a physical disposition on the part of the male Samoan to the formation of these tumors. Early middle life seems to be the time that these benign tumors become noticeable. Although very prevalent in the male, no cases have been observed in the female.

There are no venomous reptiles to deal with in Samoa. Snakes of a small size resembling the American garter snake are plentiful on the island of Savaii, but their bite has never been known to cause trouble. Centipedes are a source of annoyance at times, and the bite is often very painful, but, beyond this and the swelling, no ill effects are noticed.

Of the tropical unclassified fevers the only one that I have met with in Samoa is the simple continued fever. It is especially prevalent among foreigners who are becoming acclimated to the Tropics. With some there was a distinct history of former malarial infection, but with the majority a negative history was the rule. It is to be regretted that a microscope was not available at the time the patients of malarial history were under observation, as these few cases might have been given a specific nomenclature. As it was, only the later cases of nonmalarial origin could be overhauled thoroughly, and, in the blood of cases thus examined, there was not the slightest indication of specific cause.

Most of the cases presented no prodromal symptoms, but apparently started with a temperature varying from 100° F. to 102° F., which in a day or two reached 104° F. to 105° F. Accompanying this pyrexia there was severe frontal headache, with pains in the small of the back and limbs. Constipation and anorexia was the invariable rule, and in each case there was pronounced nervous involvement, such as muscular twitchings, delirium, and a condition almost resembling coma. In one case hiccoughs was a most trying symptom. The urine and skin, beyond an erythematous flush in the latter, presented nothing unusual. The febrile attack usually lasted from seven to ten days, and in one case it was fifteen days before the fever broke. The fever was of a distinctly sthenic type and showed no sign of breaking before the final crisis. Convalescence was speedy, with no bad after effects. In some cases there was slight catarrhal involvement of the respiratory tract, but in none of the cases was there any indication of abnormality in the liver or spleen, and, aside from constipation, the alimentary tract was normal. In each of the cases, which were

mostly enlisted men from the U. S. S. *Adams*, there was nothing apparent save a profound disturbance of the thermotaxic apparatus, which could not be attributed to the effects of the tropical heat or other causes. In view of the fact that malaria is unknown in these islands and that typhoid could reasonably be excluded, it was thought to be an expression of filariasis, although no filariæ were discovered in the blood of those examined, in which the system was revolting at the attempted introduction of the blood fluke. These cases were all strikingly similar in character, and, whatever may have been the cause or causes, all of the men have enjoyed the best of health since the attack, and, by reason of the fact that almost a year has elapsed in most cases, have apparently acquired an immunity from further invasion. This lends color to the view that the disease is of specific origin.

As to treatment, quinine was given an impartial trial in the cases giving a malarial history, but without the slightest benefit; in fact, in these cases, as well as those in which the drug was subsequently used, there seemed to be ill effects attending its exhibition, and it was therefore discontinued. Further than this, diet, hydrotherapy, and the ice bag to the head was the routine treatment in each case.

Two cases of fish-poison wound have come under my observation during the past year, due to a small fish which has a long, bony spine in the middle of its back and by which the poisoned wound is inflicted. The poisoning is characterized by rapid and extreme swelling of the part, usually the hand or foot, accompanied by severe pain and more or less prostration. The natives are very much afraid of this fish, but from what I can learn it has not often proved fatal. The treatment instituted in the cases mentioned was the injection of a 1 to 2,000 permanganate of potash solution around the wound, which seemed to act very favorably as regards checking the continued action of the poison, and, in addition to this, multiple incision of the part to relieve tension. Symptomatic supporting treatment was also administered.

Although not a few of the well-known tropical diseases are unknown in Samoa, it is a matter of interesting conjecture as to how the pathology of the South Seas will be affected upon the completion of the Panama waterway. The direct trade route through the canal to Australia, Fiji, and Polynesia in general will include Samoa, and, since no such communication with Panama itself, or the West Indies with Panama as a connecting link, has ever even been attempted, it may not be idle to speculate on the dire results which will attend any laxity in the enforcement of quarantine laws.

Manson has sounded the warning note and called attention to certain of the more deadly diseases which will have to be guarded against.

A PETITION.

[Translated.]

THE UNITED STATES COLONY OF TUTUILA,
January 7, 1907.

His Excellency THEODORE ROOSEVELT,
President of the United States, greetings.

YOUR EXCELLENCY: We write now with obedience and respect. We trust that sickness has been far from you, and that happiness rests with Your Excellency according to the will of God.

At a general meeting, representative of this colony, it was unanimously resolved to petition the President of the United States to extend the term of Doctor Fauntleroy in Samoa.

The Samoans have many diseases peculiar to their people, and Doctor Fauntleroy, by his learning as a physician and skill as a surgeon, has preserved many lives which would have met earlier death formerly.

There are yet many Samoans who are afflicted with diseases requiring surgical operation, and they are patiently awaiting their turn when the Doctor can operate upon them.

Many blessings have been bestowed upon Samoan families by the appointment of a medical officer in Samoa.

The Samoan is unaccustomed to the method and instruments of the white doctor, and he is apt to have his doubts as to the success of an intended operation. His inherent superstition has first to be overcome.

The Samoans have learned to have full confidence in Doctor Fauntleroy and willingly submit themselves to his methods of treatment.

Our people, who desire the present and future generations to be free from their infirmities, humbly petition Your Excellency, the President, to generously consent to an extension of the term appointed for Doctor Fauntleroy in his kind charge of the hospital in Samoa.

May Your Excellency live.

We are Your Excellency's true servants.

[Here follow the signatures of 17 representative Samoans.]

A PRELIMINARY NOTE ON FLAGELLATES: THEIR SIGNIFICANCE AND CULTIVATION.

By H. W. SMITH, Assistant Surgeon, U. S. Navy.

[From U. S. Naval Hospital, Canacao, P. I.]

In the spring of 1906 I operated on three cases of appendicitis which ran a peculiar course. During the first week each had considerable fever (101°–103°); severe abdominal pains, usually cramp-

like; and free purging. There was no pyogenic infection at any time, and examination of stools showed enormous numbers of flagellates. The appendices were inflamed, and parasites had been found in them, but no importance had been attached to their presence, they being considered the monads so often present in the colon. In all of these cases the symptoms continued until the stools were free from the parasites. Three cases coming closely together attracted our attention, and since that time the finding of flagellates in the stools of patients having symptoms of chronic or mild appendicitis has been regarded as sufficient to contraindicate operation. The subsequent history of these cases has demonstrated the wisdom of this position.

FREQUENCY WITH WHICH FLAGELLATES ARE FOUND.

The cases included in this paper were admitted during nine months of 1906. The total number of cases admitted in that period was 641.

Not all stools of all patients are examined, but only those in cases in which (*a*) the diagnosis is uncertain; (*b*) there are abdominal symptoms of any description, and (*c*) there are present anemia, debility, neurasthenia, and such affections of obscure etiology.

Total number of cases in which stools were examined on one or more occasions		122
Cases positive at some time for protozoa		43
Cases from which only amebæ were recovered	17	
Cases from which amebæ and flagellates were recovered	9	
Cases from which only flagellates were recovered	17	
		43

SYMPTOMS CAUSED BY FLAGELLATES.

In the group of 17 cases in which flagellates alone were found the following symptoms were noted: The symptoms in each case were not referable to any other cause and ceased with the disappearance of the flagellates from the stools. Cases in which amebae were found at any time are not included for obvious reasons, and hence I have excluded 8 cases in which only flagellates were found in repeated examinations of stools but from which amebæ were at some time recovered in culture.

1. General condition was good in 3 cases. In the remaining 14 it was impaired to a varying degree, ranging from mild signs of debility to rapid loss of weight and severe asthenia. In 4 cases 25 pounds or more were lost in less than two months. "Dyspepsia" was a frequent complaint.

2. Diarrhea was present in 13 cases, in 3 of which the number of stools per day exceeded 15. Four cases gave no history of frequency, and all of these were diagnosed appendicitis, the lesions being presumably in the cæcum and too high to cause dysenteric symptoms.

3. Blood and mucus were grossly visible in 4 cases, mucus alone in 12. In only 1 was there no note on the alteration in appearance of the feces.

4. It is notable that fever is present only in those cases in which the cæcum is chiefly involved. Three of these cases were subjected to operation, and the violent symptoms which followed the operation were doubtless due to the rapid proliferation of the parasites as a consequence of the altered intestinal functions. Flagellates were found in the appendixes, and it is easily conceivable that when present in enormous numbers they might cause a cæcitis and appendicitis not distinguishable from a mild septic inflammation or that, as in the case of amebiasis, they furnish the nidus of a superimposed bacterial invasion.

5. The diagnoses at admission were: Appendicitis, 7; dysentery, 3; diarrhea simplex, 2; others, 5.

6. Pain was usually a marked symptom and resembled in character the pains associated with amebiasis. In only two are there no notes on the occurrence of pain and tenderness. The pain is either diffused over abdomen or located at some part of the colon. In 7 cases the cæcum was prominently involved. Moderate tenderness is usually present in the painful areas. Rarely there was only abdominal discomfort.

DIAGNOSIS.

The diagnosis of flagellate colitis is usually made by the routine examination of feces after magnesium sulphate. The rapid motion of the organisms attract instant attention. At times, especially when the affected area is high in the colon, the organisms are absent or are present as encysted forms and small, highly refractive, oval, spores. In such cases repeated examinations or the use of the culture medium will be necessary. Cultivation is always advisable in order to exclude high or mild amebiasis. In many cases which later became frank dysentery the recovery of amebæ by culture preceded by some weeks their discovery in the stools.

Mucus is present in the majority of cases, and even after a saline cathartic a drop of mucus is the most favorable material for examination. It is very rarely that we find in protozoal dysentery the enormous numbers of leucocytes, plasma cells, and endothelial phagocytes that occur in bacillary dysentery. These endothelial phagocytes often closely resemble a resting ameba, but they are never motile, as are amebæ, and staining with ordinary dyes differentiates them immediately.

TREATMENT.

Stiles, in speaking of the symptoms caused by flagellates, says that they are mild and are promptly relieved by calomel in doses of one-tenth gr. This has no effect on the organisms and relieves symp-

toms only in that many parasites are removed mechanically. Under treatment by calomel, and also other cathartics, the stools are never free from the organisms, and symptoms promptly reappear when the use of the cathartic is suspended because of its effects on nutrition. Thymol, eucalyptus, chloroform, bismuth, beta-naphthol, etc., have been tried and no results obtained.

Irrigations of the colon are of benefit, but are not so satisfactory as ipecac, and the routine treatment is now ipecac in two-grain doses with irrigations of protargol (1–1,000) or silver citrate (1–4,000) on intervening days as an adjuvant. The ipecac is given in capsule (plain or salol coated) on an empty stomach and preferably early in the morning after the bowels have been well opened by a cathartic on the previous night. Some men take this amount with no discomfort; with others it is well to give one hour before the ipecac a capsule containing morphine, gr. 1/6; atrophine, gr. 1/150; orthoform, gr. IV. The saliva should not be swallowed, and a mild stupe to abdomen is of value.

The disadvantages of ipecac are known to everyone, but it works so promptly these are forgiven. Almost always two treatments cause the disappearance of pain, frequency, and of the parasites, and the restoration of the normal appearance of the stools, a result which requires weeks of irrigations. In case No. 17, dietetic and cathartic treatment was carried on in three attacks; in the fourth one ipecac treatment was given and since that time—during eight months—the patient has remained well.

A period of after treatment will often be indicated in the severe cases, and tonic bitters or a pill (Blanchard) of ipecac, gr. 1; calomel, gr. 1/2; ext. nuc. vom., gr. 1/8 will be found valuable.

ZOOLOGY.

For the satisfactory study of the organisms the employment of a culture medium is necessary.

The one I use has the following formula:

Glucose	1.0
Peptone	1.0
NaCl	.2
Aqua dist	1,000.0
Na_2CO_3	.3

Agar, q. s., is added for solid medium; in the Philippines about 12 parts per M.

The method of making the culture is extremely simple. A portion of the feces, or urine, or water is placed in the medium and apparently the essential symbiotic organisms are always carried over. Fluid media is best for the primary culture, since the fecal débris is confusing on a plate. Subcultures may be continued on fluid or

solid media according to choice. Pure cultures (of protozoa) are made from plates by Musgrave's method of lowering a lens on a solitary organism.

The medium seems to be very efficient. Bacteria do not grow luxuriantly, but to an ample degree for the necessary symbiosis; they are carried over with the protozoa, and no special prevision is obligatory. Very commonly—I am unable to say in how many cases—the favorite symbiotic organisms are spirochetes, which appear in almost pure culture after a few transplants. Organisms other than amebæ and flagellates are occasionally found, as various infusoria and a spiral protozoon with terminal flagella, which shows most striking chromatic granules scattered through a pale protoplasm.

As far as can be told, all water protozoa grow well. There have been no cases showing protozoa in the stools in which we failed to recover the organisms in culture, and there have been many not showing protozoa in the feces in which protozoa were found by culture often weeks before their discovery in the movements. Many unsuspected cases of mixed infection were recognized in this way.

The maximum growth of flagellates is reached in two to five days. they lead their active existence chiefly on the surface [of flnids], often entangled in a mass of zooglea. When the environment becomes unfavorable they encyst or sporulate, and if not suspended in zooglea may sink to bottom. If subcultures are made about once a week, the organisms maintain their vegetative existence. Original cultures made on November 29, 1906, contain both amebæ and flagellates still viable (January 28, 1907). The former was the date on which this work was begun and I am unable to state how much longer the organisms will remain viable in original culture. Flagellates grow well at room temperature, but more rapidly at 35° C. A few drops of sterile water may occasionally be placed around the edge of plates to replace loss by evaporation.

Staining.—The fresh specimen is well stained by dilute methyl green. The nuclei, chromatin, and chromatophores stand out well, and the flagella may be easily distinguished at the higher magnifications.

Permanent preparations may be made by contact of a cover glass with the surface of agar, or by adding loops from the surface of liquid to fresh egg albumen (1–5 in salt solution), which prevents disruption of the organisms during drying. The smears are fixed in absolute alcohol for four minutes.

Thionin and any of the Romanowski stains are good, but they must be used very dilute and for about half the usual time for blood. When the smear is made from alkaline media it is well to wash it after fixation in very dilute lactic acid to avoid diffused overstaining with blue and the consequent obscuration of the characteristic chro-

matin staining. The addition of small amounts of alkali will usually bring about the staining of the flagella.

Stiles's table (artificial and based only on the flagellates parasitic to man).

2. Not reported for blood:
   - A. Ventro-anterior portion excavated ..... Lamblia.
   - B. Ventro-anterior portion not excavated—
     - *a.* Anterior flagella absent ..... Monas.
     - *b.* Anterior flagella present—
       1. One anterior flagellum ..... Cercomonas.
       2. Two anterior flagella ..... Cystomonas.
       3. Four anterior flagella with undulating membrane. Trichomonas.

Stiles's table for the recognition of parasitic flagellates is not complete, but the short time during which this work has been under way does not permit me to make any statements as to the differentiation of species and zoological characteristics. Certain observations which I have made will be found mentioned in appropriate places, and in a future paper I hope to consider this phase more fully.

GENERAL DISCUSSION OF PATHOGENESIS, EFFECTS, ETC.

Flagellates are almost universally present in Philippine waters and in great variety. There is apparent no a priori reason why they should not become facultative parasites, and in this connection the use of feces agar is interesting. All flagellates recovered from stools grew well on this medium, while no flagellates recovered from water developed at all; but if the water flagellates were first passed through the glucose-peptone for a few generations, they then adapted themselves readily to the feces agar. As to the pathogenesis of the flagellates found, I believe that in this series of cases the organisms were the sole cause of the symptoms, but in general, until far more extensive clinical and biological observations have been made, the presence or absence of symptoms must be the indication of pathogenicity.

Among our hospital patients all the cases in which flagellates were found have had symptoms not referable, as far as could be discovered, to any other cause, and without exception the elimination of the parasites and the disappearance of symptoms were coincident.

There have been no autopsies among these cases, and the lesions produced can only be inferred from the frequency of mucus and the occasional presence of gross blood. It is not known if there are complications or sequelæ. I have no observations indicating the means by which their effects are brought about, but it is very suggestive that certain forms go through an ameboid stage in which they are not distinguishable from small amebæ found in undoubted cases of amebiasis, and that certain forms actively motile in fluids become ameboid on solid media, some with and some without loss of flagella.

Tabular statement of cases.

Name.	General condition.	Diarrhea.	Blood and mucus.	Fever.	Diagnosis at admission.	Pain.	Treatment.	Remarks.
I——, lieutenant-commander, U. S. Navy (3241).	Poor from cholecystitis.	3–4 daily.....	Mucus after operation.	No.....	Cholecystitis	Moderate and general.	Colonic irrigations ...	Intestinal symptoms appeared after operation and persisted until disappearance of the flagellates.
M——, private, U. S. Marine Corps (3184).	Anæmic, poorly nourished, lost 30 pounds.	12–16 daily....	Yes.....	.....	Dysentery acuta..	Tenesmus	Protargol irrigations .	Negative to Shiga's acid strain.
F——, coal passer, U. S. Navy (27).	Good	No.....	Mucus.....	100°.....	Appendix	Cramps, pain, tenderness, generally in right iliac.	Silver citrate irrigations, ipecac.	
Mc——, ordinary seaman, U. S. Navy (3547).	.....do	Slight	.....do	.....	Fistula in ano	Mild and general.	.....do	
O'N——, private, U. S. Marine Corps (3507).	Fair	Moderate.....	.....do	.....	Appendix	Colic and tenderness in cæcum, hepatic flexure and sigmoid.	Ipecac.....	
W——, private, U. S. Marine Corps (34).	Fair, feels weak, has lost 30 pounds in two weeks.	5–8 daily.....	.....do	.....	Dysentery acuta..	Diffuse pain, tenderness over sigmoid.	Ipecac, protargol irrigations.	
S——, coal passer, U. S. Navy (3218).	Good	Moderate.....	.....do	.....	Appendix	Along cæcum and ascending colon.	.....do	
L——, civilian, Filipino.	Asthenia, loss of weight.	.....do	.....do	.....	.....	General tenderness.	Ipecac and permangate irrigations.	See above.
P——, hospital apprentice, first class, U. S. Navy.	Fair, 4 attacks in which lost 1 pound daily.	4–15 daily.....	.....do	No.....	.....	General abdominal discomfort.	Three attacks, cathartics and diet; fourth attack, ipecac once, has remained well since, for 8 months.	
H——, lieutenant, U. S. Navy (2676).	Good; history of intestinal indigestion.	Moderate.....	.....do	Yes; wound clean.	Appendix	Severe, generally cramplike.	Ipecac.....	History of chronic appendicitis, severe pains, etc., followed operation. Relieved only on disappearance of flagellates.
H——, private, U. S. Marine Corps (2809).	Fair	Violent after operation.	.....do	.....do	.....do	Cramps and tenderness in right iliac and general.	.....do	Do.

J——, private, U. S. Marine Corps (2598).	Neurasthenic	do	do	do	do	Iliac running up toward the liver.	do	Same as above. Cæcal pains, tumor appendix, movable kidney.
M——, commander, U. S. Navy (2716).	Poor	No	do	No	Neurasthenia	Mild pain, general in abdomen.	Ipecac, permangate irrigations.	Felt perfectly well after disappearance of parasites.
G——, private, U. S. Marine Corps (2935).	Fair	No; undigested starch.	No	do	Appendix	First in right iliac, later along whole course of colon.	Ipecac, colonic irrigations.	Relief of symptoms coincident with disappearance of parasites.
D——, corporal, U. S. Marine Corps (3393).	Poor	10–20 per day	Yes		Dysentery acuta	Some tenesmus	Silver citrate irrigations.	Cure.
G——, private, U. S. Marine Corps (3215).	Weak; anæmic; lost 32 pounds.	6–20 per day	do		Diarrhea simplex		Ipecac, silver citrate irrigations.	Do.
M——, private, U. S. Marine Corps (3229).	Lost 25 pounds	Yes	do		do		Ipecac	Do.

A CASE OF TROPICAL FEBRILE SPLENOMEGALY.

By Asst. Surg. H. W. Smith, U. S. Navy.

Case W. S., seaman.—No malaria. Measles and pneumonia. Sore on penis eighteen months ago, which appeared after an incubation of seven days. No secondary symptoms followed.

Came to Philippines with the dry dock *Dewey* in 1906, and was ashore at Port Said and Singapore. At Singapore—June 28, 1906—he was ashore twenty-eight hours and slept and ate there.

On August 3, 1906, he reported at Cavite Navy-Yard with pain in upper abdomen. There were no objective symptoms and he was given a saline cathartic. The following day he returned with a temperature of 101° F. and continued pain; later the temperature rose to 104° F., and patient was sent to hospital.

For some days after admission he ran a continued fever, and every afternoon there recurred regularly cramp-like pains in epigastrium, which made patient writhe and press hot-water bottles deeply into the abdomen. The area of tenderness lay in epigastrium and right hypochondrium, and was not sharply localized or accompanied by spasm.

Rose spots appeared on August 10, and a diagnosis of typhoid, with cholecystitis, was made. The leucocyte count remained low, and the variations in differential counts were within normal limits. Urine and feces negative except for occasional traces of bile in urine. No parasites were found in blood taken at various times of night and day. Widal was negative beyond doubt. The laboratory strains of typhoid gave good controls and good agglutination with serum from other cases, and the observations of this blood were made by several observers at various times. The spleen at this time showed enlargement to precussion, but was not palpable.

On August 19, 1906, the evening temperature was 104° F. The next day the cramps were of unusual severity and patient rapidly fell into a state of collapse, with subnormal temperature and pulse of 48. Morphia was administered hypodermically and external heat applied. He slowly rallied and regained his former status. No blood in feces or other physical signs developed later to explain this collapse. For a long period after this patient exhibited a peculiar condition of progressive emaciation and weakness, with little fever, but with the same epigastric pain. No further information was derived from the continued laboratory examinations.

On September 25 there developed symptoms of an acute cholecystitis. The patient's condition did not permit an extensive operation and the abdomen was opened under cocaine with the intention of simply draining the gall bladder. The upper abdomen was thoroughly explored and nothing abnormal found, except moderate enlargement

of the liver and spleen without any localized induration. There were no adhesions; the fingers were passed through the foramen of palpated. The contents of the gall bladder were easily expressed

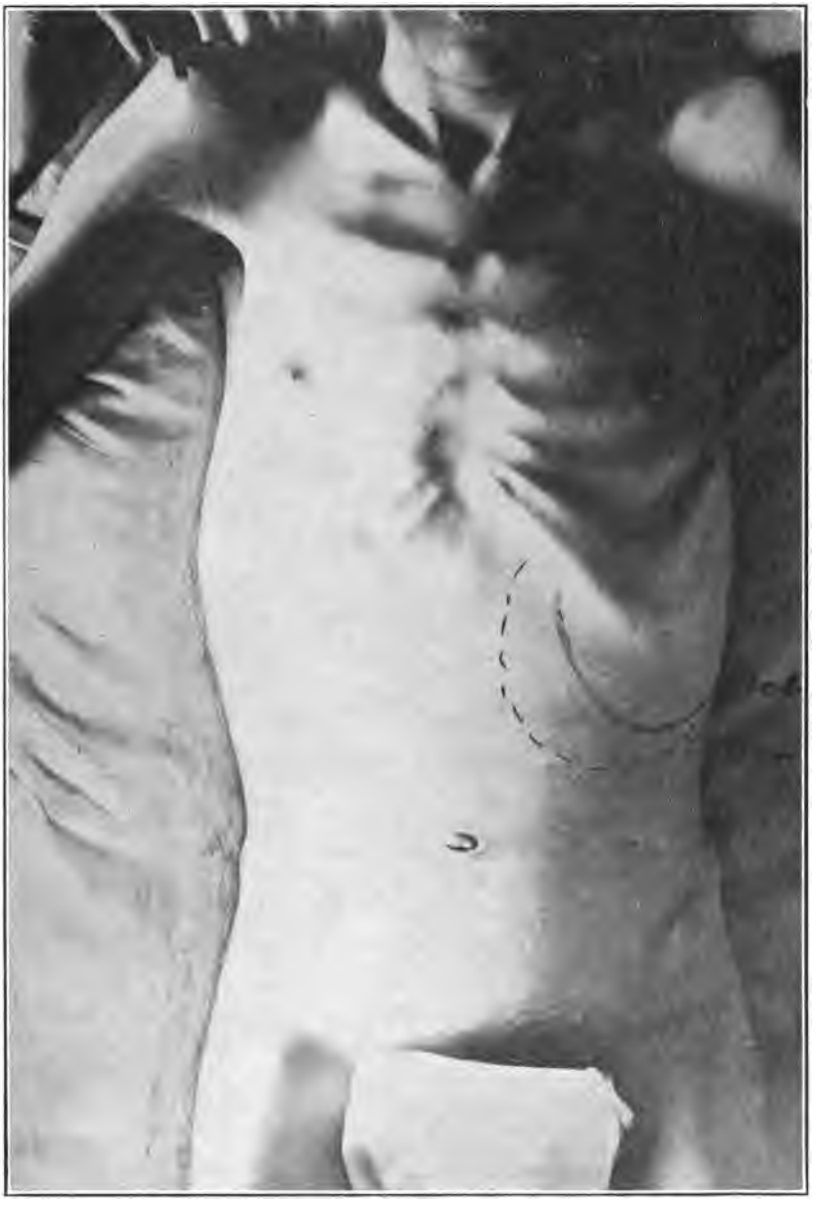

FIG. 1.—Showing barrel-shape of trunk.

and no calculi could be felt. The fundus was then sewn inside the sheath of the rectus for the purpose of opening it next day. All

first slow progression. The sudden febrile onset and continued pyrexia of this case make splenic anæmia very improbable.

9. Tropical febrile splenomegaly. The relation of Leishman-Donovan bodies to certain forms of this affection occurring in India and grouped generally under the name "Kala Azar," the development of these bodies into flagellated forms, and the possible transmission of the parasites by bedbugs, are matters discussed too largely to need further mention. The disease (Kala Azar) is characterized briefly as follows by Manson:

> Sudden onset, with high fever and perhaps with rigor and vomiting. The initial fever lasts two to six weeks or longer, and may be intermittent or remittent in type; spleen and liver enlarge. There follows a period of apyrexia, with regression of liver and spleen. Successive attacks of fever succeed each other at irregular intervals, accompanied by further increase in the size of liver and spleen and tenderness. Eventually a low, continued fever becomes persistent, and death usually occurs from intercurrent disease. Profuse sweats and rheumatoid pains are common. Skin structures are poorly nourished; complexion is earthy gray; petechiæ are frequent. Emaciation and anæmia, with the visible enlargement of liver and spleen, cause a typical appearance.

Diarrhea is mentioned by some as an important and fairly constant symptom, but in this case there were no signs of intestinal derangement. In other respects the symptoms correspond very closely to the description given of Kala Azár. Tropical splenomegaly of a febrile type is not rare in the Philippines, but as yet no light has been thrown on its etiology. Wooley[a] reports seven cases occurring in natives and leans to the opinion that the cirrhosis of the liver and spleen are due to toxic absorption from intestinal lesions, while the fever may be due to intermittent invasion by bacteria. Splenic puncture was performed in five of his seven cases; no bodies resembling the L.–D. body were found, but in one case subsequently autopsied a pure growth of a bacillus was obtained.

There is an element of doubt in the case here reported in regard to the etiological factors possibly concerned, since there may have been exposure to Indian parasites during the stay at Singapore, from June 21 to 28, 1906. When the possible diagnosis of Kala Azar was considered the patient's condition was believed to contraindicate splenic puncture, and it is to be greatly regretted that this procedure was not carried out. The blood cultures have been kept for several weeks at room temperature and at 37° C., and no organisms have been found in the coagulated blood, citrated blood, or blood agar.

Manson's finding of the L.–D. body in the liver and his idea that the parasites escape from the body via the bile ducts are interestingly suggestive in view of the nonsuppurative cholecystitis present in this case.

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[a] Bull. Johns Hopkins Hosp., 1906, 17, 28, and Philippine Journal of Science, ıne, 1906.

CLINICAL NOTES.

TINEA TROPICA CIRCINATA.

By Passed Asst. Surg. G. F. FREEMAN, U. S. Navy.

The following notes are made on a case of the disease commonly called "itch" and in many places called "dhobie itch," and often officially diagnosed "scabies." In fact, many cases are so called which are not true scabies, but are due to some micro-organism, either mycotic or bacterial, not to the acarus scabiei.

The true dhobie itch is said to be due to the microsporon minutissimum. It is also considered that several organisms produce the clinical symptoms of microsporon minutissimum infection, such as the microsporon furfur, the tricophyton, and the bacteria of pemphigus contagiosus. In the following cases, however, the tinea circinata was present, and the term "tinea circinata tropica" seems appropriate to this distinct type, which is designated by Boston as "tropic tinea."

The history of the case is briefly as follows, the patient being a marine who had recently returned from Cuba: In October, 1906, while serving in and about Cuba a skin disease like "itch" appeared at the interdigital spaces. This, however, soon disappeared. Later (in November) while at Norfolk, Va., the same lesions appeared on the legs and somewhat on the abdomen. His case was the only one in his company, although men from other companies had the affection. When he arrived at Portsmouth, N. H., about December 5, the disease spread rapidly to all parts of the body except the plantar and palmar surfaces and the head. On admission to the hospital December 27 the patient presented the picture shown in the accompanying photographs. The eruption included a variety of forms, from an erythema to small vesicles. There were no pustules present. Some lesions were distinctly circinate and some were like lichen planus, while in places, as at the interdigital spaces and on the elbows, they distinctly resembled true itch. The general appearance was certainly that of scabies, but mycelia were found at the site of every variety of lesion, so that there was no doubt as to the etiology in this instance, though many cases have been seen in which the mi-

croscopic examinations were unsatisfactory. In places no mycelia were found, as is sometimes the case where considerable inflammation is present from scratching and harsh treatment. In many instances the mycelia are demonstrated by spreading fragments of the scales on a slide, fixing and staining with weak carbol fuchsine (using gentle heat), washing with water, and drying.

This case was rather unusual, as the disease spread rapidly over the entire body after the patient had arrived in a cold climate and was surrounded by good hygienic conditions. More often under

FIG. I.—Tinea Tropica Circinata showing distribution of disease on body.

these circumstances it tends to abate. Infection comes in many ways, but particularly by contact with contaminated clothing. This patient traced his disease to bathing in dirty water, which is considered a possible source of infection. Many of the natives in tropical countries where itch is present have the disease in what might be termed mildly chronic form, and are thus a prolific source of infection in their relation to the public as laundresses.

The treatment of this disease is a serious problem oftentimes on

account of the necessity of isolation in some manner and the refractory character of the lesions which in the Tropics frequently persist for a long period of time. Many cases which in the Tropics have not responded to treatment well are soon rid of the infection when a cool climate is reached. This fact has been observed in a number of cases. Many of the parasiticides, when properly used, will eradicate the disease. Tincture of iodine is much used but can not be applied to large areas on account of the discomfort and sometimes the swelling that follows its application. In using this medicament two or

FIG. II.—Tinea Tropica Circinata showing character of lesions.

three coats are desirable, allowing the first to dry before applying a second. A stronger tincture, like Churchill's, will accomplish the same results as two coats of the official tincture. Iodine in æthereal solution, 12 to 14 per cent, seems to more effectually eradicate the disease than the alcoholic tincture. The ointment of sulphur and potassium carbonate is very efficacious. Chrysarobin collodion has been much used, especially at the interdigital spaces and on the hands. It not only causes the lesions to disappear, but serves as a dressing

which prevents the dissemination of the scales. In cases where the collodion is not used a gauntlet bandage should be applied to the hands, or white gloves may be worn. These can be constantly disinfected. Balsam of Peru has also been much used, sometimes combined with naphthol.

The list of treatments is almost endless, but the above have given most excellent results in routine treatment. No treatment should be attempted until the patient's infected clothes are sterilized and he can put on clean clothing. The tropical medication, especially if any kind of ointment is to be used, must be preceded by a soap shampoo, preferably green soap, of the entire body. On some areas a scrubbing brush can be used with benefit in supplement to the simple shampoo, and with this thorough cleansing the period of treatment is much shortened. Comparative observations have demonstrated the importance of this preparation. An ointment of sulphur and potassium carbonate made up with lard was tried on areas where the crusts and scales had not been removed by the soap shampoo and on a similar area where the parts were thoroughly scrubbed with green soap. The latter began to heal immediately, while the other gave little or no promise of response to the treatment after a trial of several days. This area was then shampood and the ointment reapplied, when it also began to heal. Following the parasiticide, a soothing ointment or lotion is often necessary. The removal of the scales and crusts by the preliminary shampoo must be accomplished even at the risk of small denuded surfaces, and the toleration of the particular patient should be consulted in selecting the parasiticide to be employed.

The case reported above was exactly similar to many seen in tropical service and was of interest as occurring in a cold climate, and more especially on account of the microscopic findings.

DENGUE AND INFLUENZA IN THE TROPICS—A METHOD OF DIFFERENTIAL DIAGNOSIS.

By Surg. E. R. Stitt, U. S. Navy.

There would appear to be but little difficulty in differentiating influenza and dengue clinically were the two diseases considered as they appear in their geographical zones of preference. In temperate climates catarrhal inflammation of the respiratory mucous membrane is the rule in influenza and noticeable rash the exception; in the Tropics in dengue the presence of a characteristic rash is the rule and the presence of coryza and bronchial irritation the exception.

When the two diseases are observed in the Tropics, however, these sharply outlined distinctions can not be drawn.

In the Tropics the type of influenza generally encountered corre-

sponds with Leichtenstern's nervous form of influenza, in which there is fever and marked nervous signs, as headache, pain in the back, limbs, and joints, neuralgia, and insomnia, while inflammatory changes in the respiratory tract are absent.

In the Tropics influenza and dengue are striking examples of sweating sicknesses, the drenching sweats at the termination of the secondary fever being even more profuse in influenza than in dengue. Coincident with such activity of the sweat apparatus various confusing eruptions are observed in influenza.

While the classical pains of dengue are referred to the joints in most text-books, yet it is the experience of many observers in the Tropics that these pains are referred to regions adjacent to the joints rather than to the joints themselves. There being, therefore, marked rachialgia in both dengue and influenza, and various joint pains being common to both diseases, there is nothing differential about the character of the pains.

The cephalalgia, postorbital aching, intense depression, and insomnia are characteristic of the two diseases as noted in the Philippine Islands, the depression being greater in influenza.

The close resemblance of dengue to influenza in tropical countries is brought out by many authorities. Sandwith, writing in The Lancet of July 5, 1890, emphasizes the similarity of the two diseases in Egypt.

It may be remembered that at the time of the outbreak of the great epidemic of influenza in 1889 the question as to whether the disease was influenza or dengue was seriously discussed in Paris. Rouvier entertains the view that dengue and influenza are identical diseases. Hamer, in the Milroy lectures, The Lancet, March 10, 1906, brings out the points of epidemiological resemblance between the two diseases.

The following observations are submitted to bring out the point of there being two distinct diseases in the Philippines which are usually diagnosed and reported as dengue:

From October, 1905, until in January, 1906, about 40 cases of a disease sent to the United States naval hospital, Canacao, P. I., as dengue were treated. The majority of these cases came from the United States naval station at Cavite, where the disease was very prevalent.

As a rule the following symptoms were recorded:

1. Sudden onset.
2. An initial and terminal period of feyer, with an apyrexial interval of from one to three days.
3. Pains in the head particularly referred to the postorbital regions . Also pains of the back and limbs, these latter not being distinctly joint pains.
4. Marked depression and insomnia.
5. Occasionally an initial eruption, which was simply a blotchy flushing of

the face and neck, and almost invariably a terminal rash which showed very constantly and characteristically on the dorsal surfaces of the wrists. In some cases the rash was universal.

6. A marked leucopenia averaging 2,000 to 3,000 leucocytes per cubic millimeter.

7. A striking variation in the differential leucocyte count from day to day of the disease. With a fairly constant reduction of the polymorpho-nuclears to about 40 per cent there was noted an increase of the small lymphocytes to about 45 per cent during the first two days, then a steady decline in their percentage, which deficiency was supplied by an increase of the large lymphocyctes, and finally, in the terminal day of the disease, the presence of from 40 to 50 per cent of large mononuclears and transitionals.

8. Although these cases were treated in the medical ward in the presence of large numbers of nonimmunes, there was not a single case of infection recorded among these other patients.

When the hospital was located at Cavite practically every case in the wards became infected with dengue while under treatment for the affection causing admission to hospital.

As there was an entire absence of mosquitoes in the wards at the Canacao hospital at this time—and mosquitoes have at all times been pests at Cavite—it was inferred that the immunity enjoyed was due to the absence of mosquitoes. (The common mosquito about Cavite and the one suspected of possibly being a factor in the transmission of dengue is the *Culex microannulatus.*)

As stated previously, these cases occurred during the months of the late fall and early winter. Sandwith, in the article previously referred to, states that in Egypt dengue epidemics were likely to come on in September and disappear by the latter part of December.

In contrast to the cases just considered, there were admitted with a diagnosis of dengue, about the latter part of February, cases presenting the following symptoms:

1. Sudden onset, similar to dengue.

2. An initial and terminal period of fever with an apyrexial interval of from one to three days, similar to dengue. (Some authors consider this range of temperature almost pathognomonic of influenza.)

3. Pains in the head particularly referred to the postorbital region. Intense rachialgia and muscular pains of the extremities. (The rachialgia more severe than in the dengue cases.)

4. More intense depression than in dengue.

5. Eruptions insignificant and for the most part secondary to derangement of the sweat apparatus.

6. Leucocyte count approximating the normal.

7. The differential count of the leucocytes approximating the normal.

8. The exhibition of a high degree of infectiousness, practically all the nonimmunes in the wards succumbing to the disease.

At the time of this outbreak there was almost an absence of any species of mosquito, so that the mode of transmission was by some means different from that concerned in the spread of dengue.

While there is sufficient evidence on clinical grounds alone of the

existence in the Tropics of the separate but similar diseases, influenza and dengue, we have striking proof of this in the results obtained from a differential count of the leucocytes, and in this laboratory method we undoubtedly have our best method of differentiating.

In making differential counts it would seem advisable to always employ the method of Ehrlich in making smears; that is, by allowing the blood to run out between two apposed cover glasses and then drawing them apart in a plane parallel to the cover glasses.

Smears made by pushing the film along by various forms of spreaders have a tendency to show concentration of leucocytes in certain areas and furthermore to show many shadow forms as a result of disruption of degenerating types of leucocytes.

It would seem that in dengue we have at first an outpouring of small lymphocytes, these shortly becoming large lymphocytes, and toward the termination of the disease we have the stage of maturity and old age of this type of leucocyte as manifested in the large mononuclears and transitionals. In influenza the blood findings vary but little from the normal.

A CASE OF ANEURISM OF THE ABDOMINAL AORTA.

By Asst. Surg. H. A. May, U. S. Navy.

T., A. V., coal passer, U. S. Navy; American, aged 23½ years; enlisted at Beaver Falls, Pa., September 22, 1906, as an apprentice seaman.

Family history negative.

Previous history.—He has had only the usual diseases of childhood, but has never been strong. Up to the beginning of the present illness he had never been seriously sick. For some time prior to his enlistment he was employed as a railroad switchman.

Present illness.—According to the statement of the patient, he had sexual intercourse early in January, 1906, of which he was suspicious at the time. Before the end of that month he noticed a pimple on the edge of the glans penis. About a month later the inguinal glands became enlarged, but were not tender or painful. He was treated by a physician at that time, taking a course of mercury. At first the sore on his penis increased in size and then gradually improved. The swelling of the inguinal glands also grew less, but he had severe aching pains in his muscles and joints, and was unable to do his work. In September, 1906, he was enlisted in the naval service, arriving at the Newport training station about the 15th of that month.

From one of his messmates on the training ship, who is now on board this vessel, it is learned that the patient was really ill during

the month of September, and that he was unable to do much of the work required of him. To his acquaintances he complained of pain in his left side, and it was known that he had a sore on his penis. To them he seemed to be generally miserable.

From the case papers furnished by the officer in command of the Newport naval hospital the following information is elicited:

October 8, 1906.—Admitted with a venereal sore one-half of an inch long by one-fourth of an inch broad in sulcus behind glans penis. Glands in groin slightly enlarged on side of sore; not tender or painful, but hard. No other glands enlarged as far as can be detected.

October 16, 1906.—A faint, dusty, red rash on body and arms. General glandular enlargement. Mucous patch on lip. Slight elevation of temperature at night, normal in the morning.

October 30, 1906.—Under appropriate treatment with potassium iodide, the mucous patch has disappeared.

December 3, 1906.—No active lesions are to be found, the patient having used mercury since October 30. He was therefore discharged to duty on the U. S. R. S. *Constellation.*

T., A. V., came aboard the *Indiana* for duty as a coal passer on December 16, 1906. On the 18th he applied for treatment for a pain in his back and left side. Examination revealed no apparent cause for his complaint, and his actions, appearance, and words gave the impression that he was a shirk who had found the work of a coal passer to be more laborious than he had supposed, and after massage of the painful area with a liniment and the application of a porous plaster he was sent back to duty.

Two days later he informed the medical officer of his syphilitic taint and was put on appropriate treatment. He persisted in his complaint of pain in the left side and he refused to do his work. He was therefore excused from duty and kept under observation. Repeated examinations were made during the next few days to ascertain, if possible, the cause of his trouble. The left kidney was palpable and not tender, the spleen was not enlarged, there was no fecal impaction, and all that could be elicited was considerable tympany over the left flexure of the colon. There was apparently no tenderness on pressure, but he complained that the deep-seated pain was made worse thereby and that he could feel it down in the thigh. The colon was irrigated with a long colon tube and much gas escaped. This irrigation was repeated from time to time and always seemed to give temporary relief from the pain. At all times his face bore an expression of anxiety and pain. His skin was decidedly yellow, but the conjunctivæ were not, and from day to day it was seen that he was losing flesh.

On *December 26* he was admitted to the sick list with a large and

severe burn of the skin, caused by a compress of turpentine which he had applied. This burn extended from the spine to the left nipple line and was about 8 inches broad above the crest of the ilium. His clothing had broken the blisters and the wound was highly inflamed. It was dressed with an ointment of boric acid in vaseline, and by January 2, 1907, was entirely healed.

On *January 4* he was found to have a morning temperature of 100° F. There was excessive flatus and apparently great pain in the left flank. In bed, he lay on his left side and kept his left thigh flexed. He claimed to have spat blood early that morning during a fit of coughing. Another and very careful examination was made of the whole body, but no additional information was obtained. The noise in the sick bay made a physical examination of his chest very unsatisfactory.

January 6, 1907.—His temperature ranged about 102°. His tongue was dry and coated on the edges. He complains bitterly of pain in his side and hip, and small doses of morph. sul. were given at intervals to enable him to sleep. It was thought that some slight dullness could be made out low down in the back at the bottom of the left lung.

January 7, at 4 p. m., his temperature was 104°, pulse 128, full and bounding. Examination of the chest could be more satisfactorily accomplished, as the ship was then at anchor. There was dullness over the lower left lung, with a few moist râles upon deep inspiration, all over the left chest, front and back. His skin was mottled purple and red all over the chest, but more especially on the back, and suggested purpura hemorrhagica. He had absolutely no cough or feeling of oppression, and respiration was easy though shallow and rapid (34). There had been no further spitting of blood.

January 8.—At 3 o'clock a. m. patient complained of a sudden and very severe pain under the left scapula, radiating into left axilla. Pulse was good and needed no stimulation. A hot-water bag gave some relief, and he was quiet until 5.30 a. m., when he complained of great pain in his chest and excessive weakness, and he began to perspire freely. He was given strych. sul. one-thirtieth of a grain by mouth. When seen by the medical officer at 8.20 a. m. his pulse was very weak and rapid, hands and feet cold; a heavy, cold perspiration bathed the entire body; there was very labored breathing and great air hunger. There was absolute flatness from the left nipple line backward, and when patient was turned onto his right side to facilitate examination of the chest, respiratory embarrassment was greatly increased. It was seen at once that the patient was in a dying condition, and immediate stimulation was

administered, both by mouth and under the skin, and external heat was applied.

A consultation with Doctor Ames and Doctor Von Wedekind was held at 9.30 a. m. It was thought that a syphilitic abscess had ruptured into the pleural cavity, and an exploring needle was inserted. Nothing but a bloody serum was withdrawn. Microscopic examination of this serum was negative, not a single pus cell being seen.

The patient responded very slightly to the enormous amount of stimulation given during the day, and it was expected that death would ensue at any moment. Urine was passed during the afternoon—specific gravity, 1.025—no albumin or sugar, and microscopically it was negative, except for a few shreds of mucus. The oppression in his chest was relieved by the sitting posture, but he still complained of the pain in his side and thigh. Gradually he became warmer, the cold perspiration disappeared, and toward night he was able to lie down in the bed and slept a little.

January 9.—In spite of continual stimulation and feeding, the patient continued to grow worse. His morning temperature was 101°, pulse barely perceptible and from 140 to 200, respiration from 40 to 60, labored and very shallow. There was absolute flatness over the entire left chest, and no sign of a respiratory murmur could be heard. About 9 o'clock a. m. respiration became decidedly easy, there was no cough, and the patient felt better, but his extremities were cold. About that time he began to vomit and hiccough, which caused him great distress. His mind was perfectly clear, he talked and was cheerful and seemed free from all pain. At 1.15 p. m. he became unconscious and died five minutes later.

Autopsy was held three hours after death, Fleet Surgeon Ames and Surgeon Von Wedekind being present.

Rigor mortis was very pronounced, possibly due to the great amount of strychnia that had been administered during the preceding twenty-four hours.

Thorax.—The right lung lies in a natural position, is crepitant throughout, and practically normal; the left lung bulges forward to a marked degree.

The heart is normal in size and appearance. Right side collapsed; left side contained some fluid blood. Pericardium normal.

Right pleura normal. Left pleura showed a mass of new adhesions throughout its whole extent. Between the pleural layers and throughout the mass of adhesions was a thick, viscid, gelatinous substance of pinkish color. Only the upper anterior portion of the left lung was normal; all the lower lobe and the posterior portion of the upper lobe were in a state of red hepitization.

While separating the pleural adhesions low down in the thorax,

near the diaphragm and posterior to the axillary line, the fingers suddenly broke through the sac and entered the thoracic cavity. Immediately there was a great gush of fluid blood, which poured forth as though it were under pressure. Considerable of it was lost, but it was estimated there must have been about 2 quarts. At the bottom of the cavity there was a mass of partially organized clots. Passing the fingers still farther down toward the posterior attachment of the diaphragm, an opening into the abdominal cavity was found, which later was found to measure 1½ inches in length and was situated about 3 inches from the spine. Through this opening it could be seen that clots were passing upward into the thorax.

Abdomen.—The parenchyma of the spleen, both kidneys, and pancreas normal. The left kidney and the pancreas entered into the mass of adhesions mentioned below. The liver was normal in size, but it showed numerous small, yellowish areas anteriorly and along its lower border. The gall bladder was enlarged and full of rather thick bile. The stomach was greatly distended with fluid. The duodenum and the upper part of the jejunum were distended with gas and fluid. Balance of intestine, small and large, was normal.

Upon tying off the stomach and lifting it up and then removing the intestine a large mass of tissue was found lying well up under the left ribs, internal to the spleen and kidney, and extending backward to the posterior abdominal wall. By adhesions it was firmly attached to the capsule of the kidney, to the pancreas, to the diaphragm, to the posterior abdominal wall, psoas muscle, peritoneum, aorta, vena cava, thoracic duct, and, in fact, to all the viscera and tissues in the neighborhood except the spleen. It was covered and surrounded by a mass of fat, was very tough, and when squeezed gave the impression of being filled with a doughy substance. When this was opened it was found to form a large aneurismal sac springing from the abdominal aorta just below the origin of the left renal artery. A finger could be passed from the cavity into the aorta and through the opening in the diaphragm, above mentioned, it communicated with the thoracic cavity.

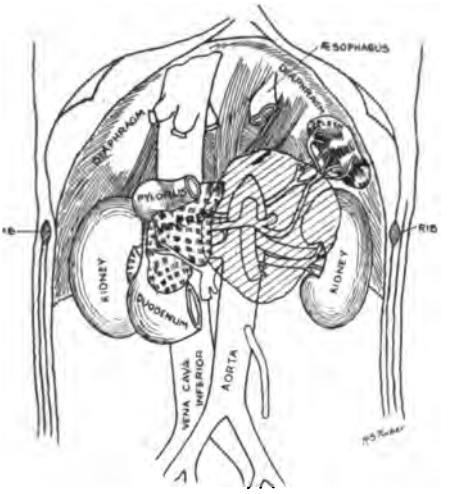
INFERENCES DRAWN FROM THE AUTOPSY.

Here was a man who, a year before, had become infected with syphilis. For a time the progress of the disease was held in check by treatment. Then a syphilitic abscess probably developed in the psoas muscle, setting up a widespread irritation of the surrounding tissues and followed by a localized peritonitis. By the time the aorta became involved in the process the adhesions in the neighborhool had grown so firm that the ulceration of that vessel resulted in a gradual hemorrhage into these adhesions until at last a strong sac was formed, opening into the aorta through its ulcerated wall. The

growth of this sac, with its pressure and dragging, explains the excessive and persistent pain in the left side and thigh. Its location, far up under the ribs and against the diaphragm, covered by stomach and intestines, shows why it could not be discovered in the many examinations that were made during the three weeks prior to death.

The sac gradually increased in size, due to increased internal pressure of its contained blood, it encroached upon the diaphragm, and its pressure caused ulceration of that muscle and eventually (3 a m. January 8, 1907) rupture into the thorax.

The acute pneumonia present in the left lung, and the very recent adhesions in the left pleura, were undoubtedly due to the extensive turpentine burn for which the patient was treated from December 26



AORTIC ANEURISM
CASE OF A · V · THORNILY · C·P.

HATCHED PORTION INDICATES EXTENT OF TISSUES INVOLVED IN SAC AND SURROUNDING ADHESIONS.

to January 2. From January 4 to 8 the temperature increased, but there was no cough, oppression, or other positive indication of a pneumonic process. The bleeding directly from the aorta through the sac and into the thoracic cavity shows why there were no apparent effects from the great amount of stimulant given during the last thirty-six hours.

The presence of an aneurism was not thought of until the autopsy revealed it. No pulsation was noticed at any time, nor was a bruit heard during the many examinations of the chest. It is possible that the noise of the ship and the unfavorable surroundings masked these adventitious sounds, and by the time that comparative quiet pre-

vailed in the sick bay after the ship came to anchor the sac had ruptured into the thorax.

The accompanying illustration shows very well the extent of tissues involved. In the picture the stomach and part of the pancreas have been removed, but the latter was firmly attached to the sac by its under surface; or perhaps it would be better to say that it was incorporated in the mass of adhesions by which the sac was formed.

A CASE OF ADAMS-STOKES DISEASE.

By PAUL T. DESSEZ, assistant surgeon, U. S. Navy.

A. F. H., age 26; white; native of United States, was admitted to the naval hospital, Chelsea, Mass., on February 22, at 5 p. m., as with bradycardia. His symptoms were as follows: Pulse, 32 beats per minute, of a full and bounding quality, which gradually fell to 14 beats per minute at midnight.

At 2 p. m., February 23, the pulse rate declined to 8 beats per minute, the quality remaining about the same. Patient had several paroxysms of vomiting shortly after admission, which subsided later in the evening, and were quickly followed by several attacks of syncope of a few seconds' duration, which alternated with convulsive seizures accompanied by opisthotinous. Cheyne-Stokes respiration was present during these attacks. Marked pulsations were noted in the veins of the neck, which were faster than the radial pulse. During these attacks the patient wore an anxious expression and was bathed in a clammy sweat. Strychnine, nitroglycerin, and caffeine citrate had no influence on his condition.

On the afternoon of February 23 the patient's pulse beats were 32 per minute, but there was a condition of general exhaustion present which gave the appearance of patient having passed through some debilitating illness.

Heart was examined repeatedly, but no murmurs were elicited. There seemed to be a reduplication of first sound. Both first and second sounds were booming in character. The area of cardiac dullness slightly increased. Apex beat palpable in the fifth interspace. Patient complained of constant pain in cardiac area. Tongue slightly coated. Post cervical and epitrochlear glands enlarged. The glands in the groin palpated easily.

Blood examined, found negative (with exception of a slight leucocytosis).

Urine examined, found negative.

Patient denies specific infection, though a gonorrhea has been detected. No other evidence of specific infection found except the

general adenopathy and a slight inequality of the pupils; also a slight rise in temperature (1° or 2° in afternoons).

The patient was put on protoiodide of mercury in gradually increasing doses, and during the week following his admission his pulse improved, reaching 48 beats per minute, though dropping back frequently to 32 beats per minute. At present writing the patient's pulse is normal and the bounding character has disappeared.

No mental symptoms remain, and to all practicable purposes the patient is well.

The diagnosis of Adams-Stokes disease was made on the three cardinal symptoms—bradycardia, pulsations of the veins in the neck, syncope and convulsive seizures. That the condition is due to syphilis is believed to be borne out by the cessation of trouble after the administration of mercury.

CURRENT COMMENT.

MEDICAL DEPARTMENT ORGANIZATION FOR BATTLE.

The Navy exists against the ever-present possibility of one emergency, viz, that of war; and every drill, every exercise, every improvement in personnel or matériel has its objective in the highest attainable state of efficiency for that event. It follows, therefore, that, important as are the duties of the Medical Department in time of peace (and these duties make for physical fitness in the moment of supreme test), the acme of its raison d'être lies in the care of the wounded during and after action. Every effort must be bent toward the fullest and best preparation to that end.

Each ship is organized completely or incompletely, efficiently or inefficiently, compared with the possibilities offered by the particular ship or type concerned, according to the ideas of the responsible surgeon; but this duty must not be considered lightly. It is a most serious problem, including the selection of stations and their equipment; the organization of the surgeon's division; the drilling of the members of the surgeon's division in the part each is to play and of all hands in first-aid methods and transportation, etc., and the sooner this subject is given the thought its importance deserves the better. We can not afford to go placidly along feeling that somehow chance will abridge the absence of specific preparation. Naval action is an event presenting special requirements. The Medical Department must be made secure in this responsibility, and that happy state is only to be reached by carefully working out every detail of the dispositions. The guiding principles in the accomplishment of this organization are given in the book of "Instructions for medical officers * * * " and the elaboration and adaptation of these by the medical officer of each ship, with the consent and assistance of the commanding officer, is to be regarded as a pressing duty. With reference to the larger classes of men-of-war a scheme formulated to fill the requirements of one ship will be largely applicable to all of the ships of her type. Of course, ships of widely dissimilar types are to be given individual consideration in this respect. Whatever the problem, it must engage the medical officer's most painstaking attention. It is an old subject, but the changes in construction, armament, and tactical maneuvers, as they influence the probable number of wounded and the methods of their management, are constantly making it a new and interesting and ever-urgent subject.

MEDICAL PROGRESS.

LABORATORY.

Passed Asst. Surg. A. W. Balch, U. S. Navy, in an article contributed to the Association of Military Surgeons and published in the Journal of that association for March, 1907, has given to the service an excellent scheme for laboratory practice on board ship. In direct relation thereto the laboratories of the United States Naval Medical School, through the work of Doctor Balch, have just recently given to the service a blood stain, especially prepared for ship use, and a sterile typhoid emulsion for making the widal test, prepared in sealed tubes, also for use on board ship. Either or both of these will be supplied to the medical officers of the Navy upon requisition forwarded to the Bureau of Medicine and Surgery at any time.

UNITED STATES NAVY BLOOD STAIN.

The stain is supplied in sealed tubes, each containing 0.075 grams. This is to be dissolved in 25 c. c. *pure* methyl alcohol by shaking several times during twenty-four hours. The solution is filtered.

The alcoholic solution should be kept from light and tightly corked.

USE OF THE STAIN.

Blood smears are made by any good method. They must be thin and must dry within a few seconds.

The smear is flooded with the alcoholic solution, about 8 drops for a cover slip and 15 to 20 drops for a slide. This is allowed to remain one minute for fixation.

Water is then added to the alcoholic solution on the smear, the two are mixed thoroughly, and the mixture allowed to remain for three to four minutes. About 5 drops of water for cover slips and 10 to 15 drops for slides will be sufficient.

The staining fluid is then flushed from the preparation with water and water allowed to remain on the film for twenty to thirty seconds, or until the blue color is lost and a pink color is seen.

The preparation is then blotted, allowed to dry, and mounted in oil or balsam.

The stain is similar to those of Wright, Leishman, and others, and may be used for any blood examination in which a stain is necessary.

The stain in sealed tubes is permanent, but the alcoholic solution is liable to decomposition in from one to several months, depending upon the conditions under which it is kept.

PREPARATION OF THE STAIN.

1. Dissolve 1 gram of pure methylene blue in 100 c. c. distilled water.

2. Dissolve 0.5 gram silver nitrate in 50 c. c. distilled water. To this solution add sodium hydroxide solution until precipitation is complete. Wash the precipitated silver oxide several times by decantation with distilled water.

3. Add the moist silver oxide to the methylene blue solution and shake occasionally during several days, or until the blue is changed to a purplish color.

4. Filter to remove silver salts.

5. Precipitate the polychrome methylene blue solution by slowly adding, with constant stirring, 500 c. c. of 0.1 per cent solution water soluble eosin.

6. Allow to stand a short time and filter through a small filter.

7. The residue on the filter is allowed to dry and is ready for use. It is this residue which is put up in sealed tubes and, with 25 c. c. of pure methyl alcohol, sent to ships and stations as required. The quantity is enough for a hundred or more specimens.

TYPHOID EMULSION.

This consists of a culture of the typhoid bacillus allowed to grow to a sufficient extent and then sterilized by addition of 1 per cent of formalin.

The emulsion is tested for sterility after twenty-four hours.

The sterile emulsion is used in all respects like the fresh culture, and agglutination is similar except that the dead organisms agglutinate somewhat more slowly.

The blood or blood serum may be diluted with water in the leucocytometer or by the platinum loop method, a dilution of 1 in 20 being convenient.

One loop full of this dilution mixed with one loop full of emulsion gives a dilution of 1 in 40—the lowest dilution which should be used for this purpose. Higher dilutions may be as readily prepared.

A NEW MODIFICATION OF THE ROMANOWSKI STAIN.

[From the laboratory of the United States naval hospital, Canacao, P. I.]

R. W. KING, hospital apprentice, first class, U. S. Navy.

The reason for adding another to the already long list of modifications of the Romanowski stain is the superiority of this method in (*a*) ease and rapidity of preparation, (*b*) rapidity of staining, (*c*) uniformity and permanency. Romanowski stains are those the staining properties of which are attributable to the salt formed by the double decomposition of methylene hydroxide and eosin. This salt is usually, but erroneously, termed eosinate of methylene blue. Methylene blue is, chemically speaking, a salt. Its molecules, like those of other salts, consist of two ions, one of which is basic, the other acidulous. The acidulous ion is known to be hydrochloric acid, and for our present purposes we shall term the basic one methylene. In adopting this view, it is evident that methylene blue becomes a synonym for methylene hydrochlorate. This will render our nomenclature less ambiguous, if not more accurate.

When methylene hydrochlorate is acted upon by strong oxidizing agents, as nitric acid or potassium dichromate, in the presence of heat, it is decomposed with the formation of methylene oxide. This salt is a red stain analogous to, if not identical with, methylen red.

If instead of the strong oxidizing agents we employ an alkaline hydroxide or carbonate, we get as a result of the decomposition methylene hydroxide, which is identical with the stain known as methylenazur. The process of decomposing methylene hydrochlorate with consequent formation of the oxide and hydroxide of methylene is commonly known as polychroming, and the resulting stain is incorrectly spoken of as polychromatic methylene blue. From what has been said it will be seen that a solution of so-called polychromatic methylene blue is an uncertain mixture of the hydrochlorate, oxide, and hydroxide of methylene. The proportion in which these salts are present depends entirely on the process used in polychroming. The method here described gives a product which is found to consist almost entirely of the hydroxide, together with small and unimportant amounts of the unaltered hydrochlorate.

Methylene eosinate: When an aqueous solution of methylene hydroxide is added to an aqueous solution of eosin, a chemical change occurs, and we infer that the ions of eosinic acid have united with those of the methylene, thus forming molecules of methylene eosinate, which, being insoluble in water, are precipitated. For the preparation of powdered eosinate of methylene this is probably the simplest method which chemistry offers.

Solution of methylen eosinate: If we had the required amount of sodium hydroxide and hydrochloric acid and wanted to make an

aqueous solution of sodium chloride, there are at least two ways in which this could be accomplished. The first, which would be analogous to Wright's method of preparing an alcoholic solution of eosinate of methylene blue, would be to make an alcoholic solution of our sodium, another of our acid, and then mix the two, when the sodium chloride would be precipitated. It could then be collected on a filter, dried, weighed, and dissolved in water. The second way, and the one all would use, would be to dissolve known amounts of our acid and our alkali in the water. In a similar way this method makes an alcoholic solution of methylene eosinate simply by dissolving the proper quantities of methylene hydroxide and eosin in methyl alcohol. The mtehod is open to criticism in that the methylene hydroxide contains staining impurities and that we do not know in what proportions the stains unite, but repeated experiments have conclusively shown that such objections are without foundation.

PREPARATION OF STAIN.

Preparation of methylene hydroxide: Methylene blue, 0.5; sodium bicarbonate, 0.25; distilled water, 50.

Make a solution, pour into a porcelain evaporating dish, and evaporate to dryness over an alcohol flame. This should require only about one hour. A water bath is not necessary, and boiling need not be avoided. When about one-half of the water has evaporated the remaining fluid should occasionally be made to flow up on the sides of the dish. This will not only hasten evaporation, but will cause an even distribution of the newly formed stain. When almost dry the stain should be watched closely and not allowed to burn. It should be dried by passing the dish over the flame until the stain shows no trace of moisture and then should be preserved as dry as possible. Stock solution of eosin: Owing to the difficulty and inconvenience of weighing the small amounts of eosin required, it will be found more satisfactory to employ a stock solution made by dissolving 15 cg. in 100 c. c. of methyl alcohol.

" Neutral solution " (quick method): Dissolve 0.075 gm. of methylene hydroxide in 25 c. c. of stock solution of eosin. This is an excess of the blue stain, and after shaking for a few minutes it should be tested by the standard staining method mentioned below. When it is found, by staining, that the proper amount of the blue has gone into solution the stain should be filtered. If a slight excess of blue has been dissolved, there should be added after filtration a small amount of methyl alcohol, usually 0.5 to 1 c. c. for each 25 c. c. of stain. By this simple method one can make an excellent stain in fifteen minutes. This avoids waiting for the slowly soluble methylene hydroxide to go into solution.

"Neutral solution" (regular method): Dissolve 0.12 gm. of methylene hydroxide in 50 c. c. of stock solution of eosin. This should be allowed to stand from four to twenty-four hours, after which a test stain will show that a sufficient amount of the blue has gone into solution. It should then be filtered and standardized. It will be noticed that the blue and eosin are present in equal amounts, which I consider the best proportion. A more intense staining of intracorpuscular parasites may be gained by adding 0.15 gm. methylene hydroxide in 18 c. c. of methyl alcohol to 32 c. c. of the stock solution of eosin, thus doubling the amount of the methylene hydroxide.

A formula can be furnished for making a Giemsa stain by this method, but since it is thought that either of the solutions given is fully as good for blood work and requires much less time, it seems unnecessary.

Standardization: One of the great objections to Wright's stain is the varying degree of dilution required at different times and by different specimens. Uniformity in dilution can be gained by the following method of standardization. The two solutions needed should be used only with a clean medicine dropper; they may be kept indefinitely.

Acid alcohol: Hydrochloric acid, 3; ethyl alcohol (95 per cent), 100.
Alkaline alcohol: Sodium hydroxide, 0.5; ethyl alcohol (95 per cent), 100.

Stains made by the regular method will, if allowed to stand some hours before filtering, become faintly alkaline, and will then show an excess of the blue. After the stain has been filtered, add one drop of acid alcohol to each 25 c. c. of stain, and test again. Continue the addition of the acid alcohol until the test stain shows the red cells free from blue. The acid alcohol is much stronger than the alkaline and too much may be added, causing the red cells to stain too intensely, while nuclei are stained a bright sky blue. When the standardization is correct the nuclei of lymphocytes are stained a dark ruby red and their protoplasm a pale blue.

Method of staining: In standardizing solutions the following method should be employed: To a freshly dried, but unfixed, blood film add 10 drops of stain (by medicine dropper); allow to remain on the slide one minute to fix; then add (by medicine dropper) 12 drops of distilled water and rock the slide. Allow diluted stain to act only two minutes.

The only changes the prepared stain undergoes are due to the alcohol. If the alcohol is allowed to evaporate there will be an excess of blue; the addition of a very small amount of methyl alcohol to replace the loss will correct this. The most frequent source of trouble is the formation of a trace of free acid from the oxidation of the alcohol, and it is this free acid which causes overstaining

with eosin and light tinting with blue. The cautious addition of the alkaline alcohol to the point of neutralization will completely restore the stain. The methylene hydroxide seems to be permanent if kept dry, but it is so cheap and easily prepared that its keeping qualities should give rise to no anxiety. This stain, like other modifications, is not well adapted to ordinary tissue staining. Smears which may contain a large amount of acid or alkaline elements can not be stained successfully without special technique.

BACTERIOLOGY.

By Surg. E. R. STITT, U. S. Navy.

The question of supersensitation, by which is meant the fact that a subsequent injection of a serum, which serum when injected for the first time was innocuous, produces death or marked constitutional disturbance, is discussed by J. R. Currie in the January number of the Journal of Hygiene.

This matter of the increase in susceptibility to a given serum during the interval between the injections is of the utmost importance in connection with the prophylactic or curative use of immune sera.

It is stated in this article that there is no reputed case of death following repeated injections of horse serum for diphtheria of human subjects. Several cases of production of grave symptoms have, however, been reported following injections when there had been administered between twelve days and six months previously injections of the same serum.

The symptoms of supersensitation usually manifest themselves by marked rashes and elevation of temperature. The article shows that supersensitation in man is in a measure similar to that noticed in guinea pigs by Rosenau and Anderson.

TROPICAL MEDICINE.

By Surg. E. R. STITT, U. S. Navy.

As a result of the investigations of R. T. Leiper (helmintholo-gist, London School of Tropical Medicine) the matter of the mode of infection in dracontiasis has been cleared up.

It was found that a solution of 2 parts of HCl in 1,000 of water killed the injected cyclops while the filarial embryos became very active and broke out of the dead host. With this probable action of gastric juice in mind, monkeys were fed with bananas in which in-

fested cyclops had been placed. At the autopsy of the animal, six months later, adult male and female guinea worms were obtained.

The female guinea worms were found in the extremities.

Leiper considers that geotropism explains the tendency of the adult females to gravitate toward the lower limbs rather than the selective instinct for the part of the body most apt to come in contact with bodies of water containing cyclops, as is held by Manson.

The recent report of the British commission in Uganda would indicate but a limited existence in the Glossina palpalis of the trypanosomes of sleeping sickness—the longest period during which they remained alive having been ninety-six hours. Contrary to earlier reports, it is thought by the members of the commision that infection only occurred through direct transmission and that there was no developmental cycle in the fly.

In connection with the treatment of sleeping sickness with atoxyl, Breiul and Todd, of the Liverpool School of Tropical Medicine, report that its use in infected animals seems to cause degeneration of the trypanosomes. In two cases of human trypanosomiasis recently treated at the London School of Tropical Medicine, the trypanosomes disappeared and injection of the blood of these patients into monkeys and rats failed to produce the disease. It is administered in 10 minin doses of a 10 per cent solution intramuscularly. It can not be given by mouth, as the gastric juice breaks up the drug. Atoxyl is meta-arsenic-anilid and contains 37.6 per cent of arsenic.

The work of Captain Ashburn and Lieutenant Craig, of the U. S. Army Medical Corps, has brought out the following interesting facts with relation to dengue:

1. That inoculation of either filtered or unfiltered blood of a dengue patient into a nonimmune produces the disease in four days.

2. The fact that the virus of the disease will pass through a filter capable of retaining the smallest known organism proves it to be at least in one stage ultramicroscopic.

3. That the disease can be experimentally transmitted by mosquitoes, and that dengue is not contagious in the ordinary sense.

In the article in the present number of the Bulletin, Surgeon Stitt has brought out the probability that dengue and influenza are confused in the Tropics. This explanation would account for the many instances recorded when so-called dengue has been contagious as ordinarily understood.

SURGERY.

By Surg. W. H. Bell, U. S. Navy.

In the Boston Medical and Surgical Journal of March 7, 1907, F. T. Murphy presents his "Observations on experimental incisions

through the abdominal wall of cats," conducted in the laboratory of surgical pathology of the Harvard Medical School.

The article includes an estimate of the relative merits of all methods of suturing the abdominal wall, based on histological and mechanical studies of the results of his experimental operations, and the deductions presented are valuable as representing well-founded opinion.

Murphy argues and demonstrates the need of careful approximation of all layers of tissue, particularly the fasciæ, peritoneum, and skin, which largely contribute the connective-tissue weight-bearing part of the scar, and cautions against the consequences of rough manipulation of the wound edges. Provided the muscles have been subjected to no further traumatism than the necessary displacement of their fibers, retaining sutures are not required, but to insure a closer apposition of these layers and the elimination of possible dead spaces any slack in the fascia may be taken up by an overlapping technique.

In the experiments only wounds that healed by first intention were considered, and the examinations were made two and four weeks after the operations. In applying his deductions to clinical possibilities, asepsis, hamostacis, and proper rest during the process of repair and all other factors important to a favorable termination are taken for granted.

He concludes:

> Judged from a histological study the suture in layers is more desirable than the suture en masse, because in this way in the process of repair the strong fibrillar tissue arising by proliferation from the fascia unites with tissue of its own kind, thereby increasing the strength of the scar and decreasing the time necessary for repair. The well-known and very commonly used method of closing the abdominal incision with suture of the fascia in layers, and with a deep supporting stitch meets this theoretical requirement of careful approximation of layers and also the practical requirement of strength and obliteration as far as possible of all dead space.

An article on "Gonorrheal joint disease and its treatment," by P. W. Nathan, which appeared in the New York Medical Journal of March 16, 1907, is of special interest to the service.

Nathan's discussion of the various forms of joint disease which follow in the train of gonorrheal infection presents decidedly new ideas regarding the pathogenesis, as well as a clear exhibition of the differential diagnosis and the possible course and sequelæ and the treatment. All of these depend upon the primary seat of the disease, which, together with the virulence of the infection, as of secondary importance, however, determines the gravity of the condition. The primary form may be in the bones, or it may be in the synovia. In either case distinct and characteristic symptoms become manifest. But beyond the importance of such symptoms stress is laid upon the

diagnostic value of a good radiograph, which will demonstrate the peculiar rarefaction of the bone in bone involvement:

This bone rarefaction appears a few days after the onset in gonorrheal osteoarthritis. And as it can always be demonstrated in good radiographs and never appears in arthritis at any stage, we have here a ready means for early differential diagnosis and can with more or less certainty make a prognosis. It can be said with certainty when the rarefaction is absent after the lapse of a week or ten days that we are dealing with an arthritis and therefore never will have bone destruction, bone overgrowth, or bony anchylosis. This is true even when we have a purulent exudation in the joint.

He summarizes the facts brought out in his paper as follows:

Gonorrheal joint disease, with the exception of the mild evanescent cases due to toxæmia, is really a pyæmic condition.

The gonococcus directly invades the affected tissues and the foci are located either in the synovial membranes (arthritis) or they are in the articular ends of the bones (osteoarthritis). In osteoarthritis the bone focus is always primary and is never caused by extension of the inflammation from the interior of the joint. Hence a gonorrheal arthritis remains an arthritis and never involves the bones, no matter how long it exists or what its intensity.

Gonorrheal joint disease may be recurrent, but never chronic. The cases which have been called chronic are those in which the initial acute inflammation has left behind bands of adhesion or other structural change in the synovial membrane in arthritis, and bone outgrowths or ankylosis in osteoarthritis. These changes, unless treated mechanically or by operation, are permanent.

The treatment during the acute stage must be on general lines and must depend upon existing conditions. The treatment of deformity must be based upon the same principles which govern the treatment of all deformities.

Finally, I feel that I must impress upon you the fact that nearly all the cases of gonnorrheal joint disease will get well without disability if the patient is properly treated during the acute stage. It lies with the general practitioner and the genito-urinary surgeon to prevent the serious, often lifelong, disabilities which sometimes follow in the train of a gonorrheal joint infection.

In the April number of the American Journal of the Medical Sciences, Henry Wireman Cook presents some valuable lessons on cardiovascular regulation during and after operations. His observations extended over a long period as regards individual cases and include a large number of cases, and his deductions merit most serious thought and practical consideration. Indeed, every line of his paper forces conviction as to the importance of his subject, and after reading it one feels impelled to the indicated necessity of carefully studying the vascular condition of a patient in anticipation of operation, with a view to insuring the most favorable outcome against the several disastrous tendencies of conditions expressed by material variations of blood pressure. The cardiovascular system offers the most important data to a correct diagnosis of the possibilities of surgical endurance and at the same time, fortunately, is the most accessible indicator.

A diagnosis, therefore, of the true cardiovascular state and a proper

regulation of the system before, during, and after operation "is of preeminent importance in the successful conduct of any surgical case of more than the most trivial character," Cook says; but whatever the tension—whether abnormally high or abnormally low—or that normal blood pressure representing in general the moderate grades of failing compensation, the finding must be correlated with other vascular and general symptoms, particularly the area of cardiac dullness, quality, and rate of pulse, character of the arterial wall, facial aspect and subjective symptoms, and precautions must be taken to guard the case against such dire results as acute cardiac dilatation, cerebo-arterial rupture, hemorrhage, and renal affections, on the one hand, and pneumonia, local infections, thrombi, respiratory failure, and shock on the other. An educated touch and auscultatory and percussion skill, means to an accurate estimation of pulse strength, and in ability to properly interpret and correllate the data seem, in the light of Cook's ideas, to be indispensable accessories to a surgeon's equipment and ultimate success. The Riva Rocci apparatus is most convenient and reliable in determining the tension, and may be used at as frequent intervals as necessary.

In general, the tendencies of the high and the low tension cases correspond to the similar cases in general medicine, and their study along these lines preliminary to operation becomes an imperative duty.

"The general rationale of prophylactic and corrective treatment in these cases follows naturally, after their recognition, from an application of such measures as tend to counteract the existing condition and the avoidance of those procedures that would exaggerate it. Thus, when abnormal hypertension exists prior to operation, a preliminary reduction of the tension should be accomplished, which reduction should be maintained at least through the first part of the operation and throughout when hemorrhage can not be easily controlled, as the tendency to hemorrhage is, of course (coagulation time being constant), in direct proportion to blood pressure. This reduction in tension can be easily and equably accomplished in the majority of cases by the exhibition of sodium nitrite, the vasodilator which has proved preferable in my experience." Throughout operations these patients need careful watching and the hypertension tendencies of the Trendelenburg positions, asphixia, and subdisphragmatic packing in abdominal operations avoided as far as possible.

"In these hypertension cases chloroform is not indicated, as has often been urged for arteriosclerosis, for, although chloroform does lower blood pressure the same effect can be produced by the vasodilators without the marked inhibitory and toxic action of chloroform."

"Low-tension cases in general stand operation well * * * in

view of the hypertensive tendencies of operation and anesthesia," but "their low resistance either dependent on or associated with the low tension may and should be corrected after operation by active stimulation" with some such drug as strychnine. In these cases also "the preliminary purging and fasting should be less stringent and nourishing food should be given as soon after operation as the gastric condition will permit."

The postoperative care of a patient demands careful watching and an early recognition of the cardio-vascular signs which portend such complications as hemorrhage, shock, infection, and cardiac dilation, and in which the cardio-vascular system plays the most important part.

An article on "Subdeltois Bursitis" in the Boston Medical and Surgical Journal of March 21, 1907, by Charles F. Painter, marks the growing importance of this subject. It is one which should be of particular interest to naval surgeons by virtue of the usual etiology (traumatism) of the condition. An occasional infection of this bursa resulting from the local action of a systemic toxin by no means takes the condition out of the realm of possible naval surgical experience.

A study of the anatomical relations of this bursa locates it immediately beneath the fibers of the deltoid muscle and directly above the fibrous capsule of the shoulder joint, and topographically it is marked by a point just inside the point of the shoulder. It is thin walled, and normally contains a very little thin fluid, though in diseased states these conditions may be so radically reversed as to give a definite shadow in the X ray. The pathological changes responsible for this are very varied in character.

Painter points out that in the cases induced by single, direct violence the symptoms of the bursitis probably always develop several days after the injury, though these may be masked for a time by the immediate effects of the trauma. In the case of repeated slight trauma the development of symptoms is necessarily much more insidious and correspondingly less acute and perhaps less definite, alternating periods of severe pain with those of comparative freedom. In these cases, also, fluctuations are not common and a dull ache associated with stiffness of the shoulder are the early subjective symptoms in the majority of instances. The pain when sharp is distributed over the front of the shoulder joint, radiating down to the insertion of the deltoid and even as far as the forearm and fingers. Restricted motion, both active and passive, is the most constant and important sign and corresponds with what should be expected from the anatomical relations of the diseased bursa. Reflex muscular spasm is alone the inhibiting force. The contour of the shoulder is not conspicuously altered, though there may be slight swelling localized over the bursa or more or less atrophy of the muscles about the

shoulder in chronic cases. Slight localized elevation of surface temperature has been noted, and acute tenderness to pressure over the bursa is a constant symptom.

In the opinion of Painter, the only treatment worth considering in those cases which have resisted the palliative measures for six months or more is incision and removal of the entire sac. The operation is very easily performed by separating the fibers of the deltoid muscle. If the walls of the sac are thickened, it is easily found and removed; otherwise a little dissection is sometimes needed to find it. Care should be taken not to incise too far out on the point of the shoulder, and in closing the wound the muscle and skin should be sutured separately. A Vilpeau, or double sling, will complete the dressing.

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FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY PART OF THE WORLD, AND PERTAINING TO THE PHYSICAL WELFARE OF THE NAVAL PERSONNEL

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This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, advanced therapeutics, surgery, medical department organization for battle, new methods of treatment, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service, not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. RIXEY,
Surgeon-General, U. S. Navy.

SPECIAL ARTICLES.

THE WEST INDIAN BILHARZIOSIS IN ITS RELATION TO THE SCHISTOSOMUM MANSONI (SAMBON, 1907), WITH MEMORANDA IN TEN CASES.

By Passed Asst. Surg. R. C. HOLCOMB, U. S. Navy.

THE HISTORY OF THE INFECTION IN THE WEST INDIES.

In December, 1902, Manson published a case of Bilharziosis, the patient having lived only in England and the West Indies. In the West Indies he had lived principally at Antigua. Unlike the type of infection prevailing most extensively in South and North Africa, which is characterized by the voiding of an egg with a terminal spine in the urine of the host, this infection was characterized by the voiding of a lateral spined egg in the feces; and repeated examination of the urine failed absolutely to reveal the presence of an egg in that excretion. Manson had this case under observation for several weeks. In April, 1904,[2] Dr. I. González-Martínez, of Mayaquez, Porto Rico, in a pamphlet entitled *La Bilharziosis en Porto Rico*, reported an infection of the same character occurring in two youths of Mayaguez who had never left their native island. Both the youths, during the time that they were under observation, voided eggs in the feces, all possessing the lateral spine. Doctor González-Martínez, in this pamphlet, states that Dr. J. E. Saldaña, of San Juan, had previously found one case, but had not reported it. In December, 1904, Doctors Ashford, King, and Gutierrez-Igaravidez, in their report covering the work of the commission for the study of anæmia in Porto Rico,[3] reported incidentally finding in the fecal examinations among their many cases of uncinariasis, the eggs of the *Schistosomum*. In all cases reported by them the egg possessed the lateral spine and was voided in the feces only. In 1906 Gunn[36] reported the lateral spined eggs found in Porto Ricans as far away as San Francisco. These cases had the lateral spine egg in the feces, and there were no ova in the urine. In October, 1905, Asst. Surg. William N. McDonell, U. S. Navy, while associated with the writer at Culebra, Virgin Islands, found the same type of egg in the feces; and still later, the writer[4] found the infection at Vieques, another of the Virgin group. Other West Indian islands have shown the infection. In 1904, Letulle[5] reported a case of the intestinal form contracted at Martinique. This was followed by several reports confirming that island

as a source of infection. Lahille[32] reported a case in May, 1906, which occurred in a native of Guadeloupe, who had served in the French volunteer infantry at Martinique; and Higgens,[35] in reporting the presence of the *Schistosomum* in the Canal Zone, mentions six cases in negroes from Martinique. All of these cases voided in the feces the eggs with the lateral spine; and in Higgens's cases the urine upon examination showed no sign of ova. In his report, Higgens mentions the fact that Brem[35] found the egg in the feces of a laborer from Venezuela. In this case the urine was also negative for ova. I have since received a letter from Doctor Brem,[45] in which he informs me that he has found another case in a Venezuelan, and that Doctor Bates has seen one infection in a Columbian. Caldwell, of John Hopkins Hospital, in 1905, found the lateral spined ova in a sailor from Trinidad. Brem informs me that he has found it in a Jamaican negro who had lived in Trinidad, and who was probably infected there; for this infection has never been found among the numerous Jamaicans who have been examined on the Isthmus. Brem[45] also found it in six negroes from Martinique, and in one patient from Antigua. Blumgart, of New York, in 1905, found a case of the intestinal type in a German, aged 27 years, who had probably contracted the infection during a seven years' stay in Brazil. From Habana, Cuba, the health reports show the same infection, of the intestinal form, and at the hospitals at Ancon and Colon, on the Isthmus of Panama,[8,35] the same lateral spined eggs are being found in the feces. At the Ancon hospital some twenty-five infections have been discovered since Brem[45] first found it there in 1905.

It is thus evident that throughout the West Indies an extensive infection exists of a *Schistosomum* producing a lateral spined egg which is voided in the feces of the host. In Porto Rico the infection is now quite well known, and very few with whom I have talked on the subject, and who make a routine examination of their patients' feces, have failed to find the lateral spined egg.

THE DISTRIBUTION OF THE INFECTION PRODUCING LATERAL SPINED OVA.

The most frequent infection occurring in Africa is the infection of the *Schistosomum hematobium* producing the eggs with the *terminal* spine and voided in the *urine* of the host. In Cape Colony this variety appears to exist almost to the exclusion of the variety appearing in the feces of the host and having the lateral spine. Harley, the first to discover the eggs of the fluke in the urine in this district of Africa, in his third communication to the Royal Medical and Chirurgical Society, says: "In all my own cases I can positively say that only one form of egg has existed, namely, that with a terminal spine. Variation in the size, length, and outline of the egg is often observable; but I have never seen any egg with even a tendency to the formation

of a side spine. I even doubt whether this peculiar form exists in the *Distomum hematobium* itself."[9] Brock,[10] and others working in this district, have also stated in their articles on the subject that they never encountered the egg with the lateral spine. In South Africa it would appear from the many reports that have been made from that district that the infection as it exists there is largely limited to a parasite that produces eggs with a terminal spine, which find their way from the host in the urine, and in its severer infections is the cause of the endemic hematuria of this district.

In northeast Africa, and particularly among the *fellahin* that find their way to the Kasr-el-Ainy hospital at Cairo, both the intestinal form of parasite producing the lateral spined eggs and the genito urinary form producing the terminal spined eggs are found, but the former variety are comparatively infrequent. Thus, Sandwith[11] and Milton,[12] in summarizing 930 cases from the Kasr-el-Ainy hospital, give the following numbers:

	Number.
1. Bilharziosis of the bladder	599
2. Bilharziosis with vesical calculas	134
3. Bilharziosis with urinary fistula	113
4. Bilharziosis recti and general bilharziosis	53
5. Bilharzia infection found at autopsy	29

It may thus be seen that perhaps less than 5 per cent were of the intestinal form.

Grobel,[24] reporting from Africa, states that out of 1,449 cases of Bilharziosis collected by him, 266 had urinary fistulæ and 49 had the intestinal form of infection. These 49 cases he divided into 24, in which the eggs were found in the feces only, and 25 cases in which eggs were found in both the urine and in the feces.

In Central Africa, however, it appears that the intestinal form is the most frequent. Broden, in a report from the Kongo, incidentally mentions the frequency of Bilharziosis there, the cases being invariably rectal and having the lateral spine. Low made the same observation from Uganda. It would thus appear that in northeast Africa the two generally described forms are dependent upon two species of *Schistosomidæ*, that the variety producing eggs with the terminal spine exists in its purest form in Cape Colony, that the variety voiding eggs with the lateral spine exists to some extent in the Kongo and Uganda, hat a more or less mixed infection occurs in Egypt.

THE EGGS WITH THE LATERAL SPINE ARE VOIDED IN THE FECES OF THE HOST ONLY.

Mackie and Sonsino early recognized the fact that the terminal-spined ova were invariably voided in the urine of the host, whereas the lateral-spined variety is voided in the feces of the host.

As long ago as 1882, James Mackie,[26] of the Deaconesses' Hospital, in Alexandria, writing of this disease, says, "* * * in my own

experience the ova found in the rectum have, in nearly all cases, the spike placed laterally, differing from those generally found in the urine, which have the spike at the extremity. The presence of *Bilharzia hematobia* may be manifested by dysentery symptoms without the patient ever having shown any sign of urinary disorder or any ova being found in the urine after repeated and careful microscopic examination." In this paper he cites a case in which, with Doctors Murison and Vernoni, he made careful examinations of the urine, but was never able to find ova in that excretion.

Xancarol,[46] of the Greek Hospital at Alexandria, in 1882 reported two cases of bilharzical dysentery, in which he found at autopsy almost exclusively the eggs with the lateral spine in the tissues of the bowel.

Sonsino,[25] in reviewing his experience at the Kasr-el-Ain Hospital and other hospitals, states: "According to my observations, confirmed by those of Mackie, the eggs in the tissues of the intestine often present a lateral spine instead of the ordinary terminal spine, whilst in the case of eggs discharged with the urine the spine appears to be terminal."

In the West Indies, where the reports of the disease are now plentiful, the form found by all observers seems to be almost invariably the intestinal variety, voiding the eggs with the lateral spine. When Manson reported his case in 1902,[1] he advanced the opinion, as did Harley before him, that the two types of infection were probably due to different species of parasites. This view has led to considerable difference of opinion. Many observers have accepted Manson's opinion, and Sambon[15] has recently suggested the name *Schistosomum mansoni* for the fluke which produces the lateral-spined egg.

The fact that the West Indian Islands—Martinique, Antiqua, Vieques, Culebra, Porto Rico, and Cuba—and the Isthmus of Panama, Venezuela, and Brazil have so far shown the intestinal type almost exclusively would appear to be good evidence to show that the *Schistosomum mansoni* is a species distinct from the *Schistosomum hematobium*, and that the former has found in these localities the conditions favorable for its dissemination.

The infection of these *Schistosomidæ* is fairly frequent in Egypt. Bilharz and Griesinger,[11] in Cairo, found 117 cases in 363 autopsies, or in 32 per cent. Sonsino[11] found 42 cases in 91 autopsies, or in 46 per cent. Kaufman,[11] in Cairo, found 165 cases in 500 autopsies, or in 33 per cent. Kautsky,[11] in examining 124 schoolboys near Cairo, found that 79 per cent had the infection. Engel Bey[28] found it 61 times in 200 school children, or 30.50 per cent. Its frequency and ease of infection may be judged by the numerous cases reported in Great Britain among the troops returning from the Boer war. I will mention further in this report a number of cases returning from that campaign to Canada or the United States who harbored this infection.

At a conservative estimate it would appear that about 30 per cent of the people about Cairo harbor these *Schistosomidæ*, and of these 30 per cent, about 5 per cent of the cases, or about 1.5 per cent of the total, harbor the lateral-spined infection. On the Isthmus of Panama the laborers are drawn from many of the West Indian islands, but principally—so I am informed by Surg. H. C. Curl, U. S. Navy, formerly superintendent of the Ancon Hospital—from Jamaica, Barbados, Martinique, Antiqua, and the Fortune Islands. It would certainly appear, if the eggs with the lateral spine and those with the terminal spine were the eggs of the same parasite, some of the latter variety might be found in the urine, and, judging from the Egyptian statistics, for each case voiding the eggs with the lateral spine one might expect to find 17 cases voiding eggs with the terminal spine. Yet in 2,508 specimens of urine examined at the hospitals at Ancon and Colon during January, 1907, which hospitals that month reported 7 cases of Intestinal Bilharziosis, not one egg of the terminal-spined species was found. Using the Cairo ratio of 1 to 17, there should have been 119 cases, or, using Grobel's ratio (1 to 29), there should have been 203 cases.

BILHARZIOSIS IN UNITED STATES AND CANADA.

In the United States and Canada many cases of Bilharziosis have been reported, but in the majority the infection has been traced to Africa. In 1882 Dr. D. S. Booth,[40] of Sparta, Ill., reported a case of supposed infection by the *Bilharzia hematobia*. The case occurred in a young woman, the father of whom found his daughter's urine "alive with worms," and Booth reports finding in the urine (1) ova, with spines, (2) ciliated embryos, and (3) mature worms. The description is unsatisfactory. In 1900 Walker,[13] of Evansville, Ind., reported a case from the same district as Doctor Booth's case, and states that he found in the urine (1) ova, (2) embryos, and (3) two adult worms. He furnished drawings with his article, and they are not convincing that the eggs are those of the *Schistosomum hematobium*. T. N. and H. N. Rafferty,[41] of Robinson, Ill., report this same case in 1904, and also submit drawings of (1) ova, (2) embryos, and (3) worms which they found in the urine. Their drawings are as unconvincing as those of Walker. In the same year (1900) Lewis,[30] of Mount Carmel, Ind., reported a case as Bilharziosis in a woman who passed in the urine a number of bright-red motile worms one-sixth of an inch long. These cases are the only cases I have found in the United States in which there is no history of a previous residence in Africa, and the writer is not convinced that these cases were infected with the *Schistosomum hematobium*.

A case of Bilharzia disease was said to have existed in Georgia (Ward [42]), but there is no data at hand to judge the character of this

infection. Doctor Andrade is said to have found a case of urinary form in Jacksonville, Fla. In 1900 the infection was found in an Egyptian at the World's Fair.[42] In 1903 Pool[34] found a case with terminal-spined ova in the urine of an Egyptian sailor, who had brought the infection from Africa. In 1904 O'Neil[29] reported a case voiding terminal-spined ova in the urine by a man who had served during the Boer war in South Africa. In 1905 Smith,[43] Anders and Callahan,[31] and Walker[37] reported the terminal-spined eggs in the urine. Smith's 7 cases were discovered while examining 45 specimens of urine among the Boers and South African negroes who took part in the St. Louis and Atlanta fairs. Anders and Callahan's case was a Philadelphia cab driver, who had previously lived in Africa. This case also had the urinary form with terminal spine. Walker reported 2 cases of urinary form who had served in the Boer war of South Africa. Ross,[38] of Quebec, in 1906 reported 2 urinary cases infected while on military duty in South Africa. In 1907[39] Robbins, of Detroit, also reported a case of the urinary form with the terminal spine in a man who had taken part in the Boer war.

THE INFECTION OF THE SCHISTOSOMUM HEMATOBIUM IN TROPICAL AMERICA.

In 1905 Dr. J. Cortez,[33] in *La Juventud Medica*, reported the case of a man with hematuria, who was born in Guatan, Guatemala, and who voided in his urine the eggs with the terminal spine. In August, 1900, Doctor Zeiler, at the Ancon Hospital, Isthmus of Panama, so I am informed by Doctor Brem,[45] found two infections of this parasite voiding the eggs, with the spines terminally placed, in the urine. One of these cases had a combined infection of both the genito-urinary and the intestinal form. In the urine Doctor Zeiler found the eggs with the spine located terminally; but, on the other hand, the eggs found in the feces had the spine placed laterally. I am not informed where either of these patients obtained their infection. In 1907 Passed Asst. Surg. C. St. J. Butler, U. S. Navy, found two eggs with the terminal spine in the urine of a Porto Rican at San Juan. Doctor Butler does not know where the infection was acquired.

THE CAUSE FOR THE SIDE SPINE ON THE OVUM.

In the early work of Bilharz,[16] at the Kasr-el-Ainy hospital, he reported both the lateral and the terminal spined eggs. The latter he called the true eggs, and the former he regarded as not true eggs. In one instance he found the egg with the lateral spine in the anterior part of the "oviduct" of a parasite,[16] the further course of which he thought contained the so-called normal eggs. Bilharz and Griesinger, both of the Kasr-el-Ainy hospital, appeared to be very much puzzled with this type of egg, and it appears that they found them in the tissue of the liver and in the mucous membrane of the intestine.

THE ORIENTATION OF THE OVUM IN THE OOTYPE (AFTER LOOSS).

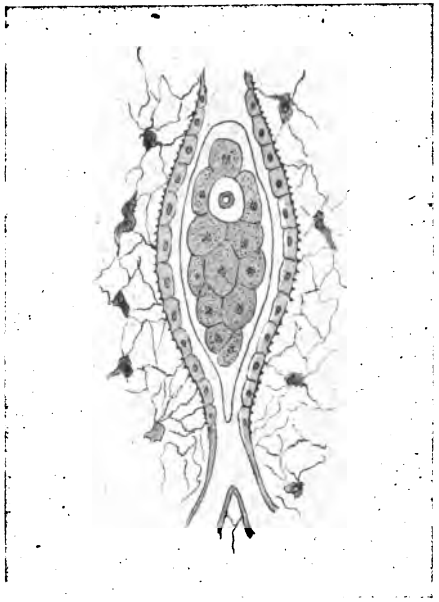

FIG. 1.—Showing the development of the terminal spine. The reticle axis of the ootype and the long axis of the ovum bear the same relation to each other.

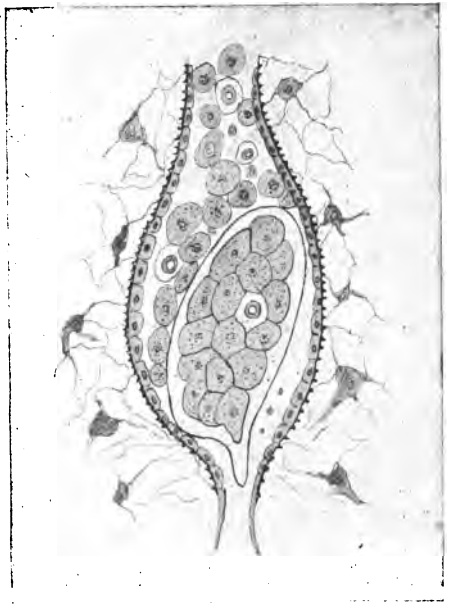

FIG. 2.—Looss believes that the crowding of the daughter cells from above causes the ovum to rotate from the verticle axis of the ootype. This changes the relation of the long axis of the ovum to the shell ducts.

NOTE.—Fritsch (Archiv fur mikrosk. anat. Band xxxi) gives a series of cross sections of the female producing the lateral spined egg, tending to show that the shell duct, or "oviduct," enters the ootype at one side instead of in the center. The type of egg from this ootype would invariably have the lateral spine and not depend upon the daughter cells for its orientation. Looss (Arch. fur mikrosk. anat. Band XLVI), after referring to the work of Fritsch, Lortet, and Vialleton, who describe in the case of the lateral spined ovum the shell ducts as entering the ootype from the side, lays especial stress upon the crowding of the daughter cells from above, causing the orientation of the ovum, which he claims results in the development of the side spine.

Sonsino, to explain the lateral spine, advanced the opinion that it was produced in some way by the pressure of the circular coat of the bowel upon the pregnant female.[25]

Looss,[18] in his most recent communication, has given a very clear explanation for the position of the spine on the egg, the difference in the location of the spine being the result of the orientation of the egg in the ootype. (Refer to figs. 1 and 2.) In the terminal spined egg, the ovum lying vertically in the long axis of the ootype, the spine is developed terminally. In the lateral spined egg the orientation is changed and the rotation of the vertical axis of the egg from the vertical axis of the ootype, by the crowding of the daughter cells from above, thus forces the spine to develop laterally. Looss[18] has suggested that it is possible that these eggs with the lateral spine are produced by females who are old enough but have not copulated.

In 1888, some seventeen years earlier, Fritsch[27] gave much the same explanation for the development of the lateral spine. The position of the spine on the egg, whether lateral or terminal, he regarded as due to the situation of the shell duct as it entered the ootype. In the terminal spined variety, according to Fritsch, the opening into the ootype was in the axis of that organ, whereas in the lateral spined variety the opening was laterally placed.

The females thus described by Bilharz, Fritsch, and Looss were possibly not abnormal types. Such an ootype as described by Fritsch must have produced invariably the lateral spine. The mere fact that the spine was lateral would hardly account for the fact that these females usually selected the intestinal tract in which to deposit their eggs, nor would it explain why this particular worm should find the conditions to perpetuate its type existence when transplanted to the West Indies. The West Indian infection proves that they are not the eggs of unfertilized females, and some of my cases, which were under observation for one year or more, show only too well the persistence of the type of egg can not be attributed only to young females. In the light of these facts I believe that these able observers have described the essential difference between the female *Schistosomum hematobium* and the *Schistosomum mansoni*.

THE OCCURRENCE OF THE LATERAL SPINED OVUM IN THE LIVER.

It has long been noted that the lateral spined egg is more frequently found in the liver than the other variety. Bilharz[16] and Griesinger[16] early found the empty ova in this location, and recently Symmers[19] made a careful study of the liver in cases of Bilharziosis. He finds that the liver is enlarged. Dull markings appear through the capsule from the increased amount of perivascular tissue. A variable number of flat, china-white nodules project from the capsules, varying in size from the head of a pin to a split pea. On section he found an increase

in the capsule of Glisson, which surrounds the portal canals. The cut surface gives the appearance of white pipestems running through the organ. The ova were found in the center of the fibrous tissue, and none were found free among the hepatic cells. The ova were usually empty and frequently noted to have the lateral spine. Sandwith[11] confirms this finding. In case VII of this report the abscess of the liver was probably the result of this liver infection. Kuchenmeister[16] long ago suggested the possibility of this infection causing an abscess of the liver.

It is not improbable that the *Schistosomum mansoni* of the West Indies is a lineal descendant of the parasite now known as existing in central Africa, and that it was carried to these localities by the traffic in slaves. It is also possible that the infection will be found to exist in the districts where the slaves were extensively marketed.

THE INFECTION OF THE SCHISTOSOMUM HEMATOBIUM AND THE SCHISTOSOMUM MANSONI IN THE SAME HOST.

As previously noted, both parasites sometimes exist in the same host. This class of infection appears to be most frequent in Africa. Of many cases in the West Indies I know of but one case which harbored both species of parasites. In the infections of this class the *Schistosomum mansoni* seeks the lower bowel, whereas the *Schistosomum hematobium* seeks the genito-urinary tract. This type of double infection depends upon four *factors*—the harboring of the *male* and *female* of *both species.*

There are cases in the literature which without doubt seem to show that the *terminal-spined* ova have been found in the submucosa of the bowel and are doubtlessly voided in the feces also.[20] Such a condition, the voiding of the terminal-spined ovum in the feces associated with the lateral-spined ovum, would appear to cast confusion on the type of infection.

I have recently heard of a case which was encountered in one of the hospitals on the Isthmus of Panama in which both the lateral and terminal-spined ova were found in the feces. It is said that all proper precautions were taken to prevent urinary contamination of the feces, and that examination of the urine failed to reveal the presence of ova. In this case it would appear that only *three* of the four factors necessary to produce the coexisting intestinal and genito-urinary type of Bilharziosis were present. The explanation for these findings, in my opinion, is that it is due to the fact that the *male* and *female* of the *Schistosomum mansoni* were present in the host, but only the *female* of the *Schistosomum hematobium.* The male of the former species would without doubt carry this female to the tissues of the intestinal tract where the mature flukes are always found in pairs. The eggs voided by the female of this union may or may not be fertile.

THE FREQUENCY OF THE INFECTION OF THE SCHISTOSOMUM MANSONI.

At the Kasr-el-Ainy hospital, as previously noted, the infection was found but 53 times in 930 autopsies. Grobel, in 1,449 cases of Bilharziosis, found the intestinal type 49 times. Twenty-five of these cases were a mixed infection; the remaining 24 showed no evidence of the egg in the urine. The Porto Rico Commission for the Study of Anæmia found it 21 times in 5,490 fecal examinations. The commission states in its report that the infection probably occurred more frequently than the figures would indicate, and they give three reasons for this: *First*, the eggs were not sought for; *second*, when an estimate of a sufficient number of the ova of uncinaria was made, search was concluded, and *third*, in cases known to be infected there were periods during which no ova could be found in the feces. It is possible, also, that their method of examining the feces without diluting with water failed to show the egg, as the egg stands out very clearly when the feces are thus prepared. In an examination of 53 natives of Culebra and Vieques the writer found the infection 10 times. In the report for January, 1907, from Ancon Hospital on the Isthmus, the infection was found 6 times in 1,216 examinations of the feces.

SYMPTOMS CAUSED BY THE SCHISTOSOMUM INFECTION.

It appears that like the infection of the *Schistosomum hematobium*, the *Schistosomum mansoni* in perhaps the majority of cases causes no apparent subjective symptoms in the host. When it is found it is most always associated with uncinariasis, and such symptoms as are present disappear or are ameliorated when the treatment for the hookworm is commenced. But there are times when the patient suffers from a train of symptoms which upon autopsy is shown beyond a question to be due to this infection. The symptoms of all forms of Schistosomasis, whether they are the result of the new Asian blood fluke, the *Schistosomum japonicum*, the *Schistosomum hematobium*, or the *Schistosomum mansoni*, results from the deposit of eggs in the tissues. In the *Schistosomum mansoni* infection, a form of dysentery, which was first clearly described by Zancarol[46] and Mackie,[26] results from these egg deposits. Cases of the same character resulting in death have been described in West Indian infection. (See Ref. 3, Appendix, case 42.) Burfield and Shaw[20] have recently reported a case with several gluteal and lumbar abscesses. The symptoms in their case justified an exploration in the appendical region. The distal end of the appendix had sloughed away, the proximal end was removed and upon section showed in its structure numerous ova of both species. In Case VII of this report the abscess of the liver was attributed by me to the infection of the *Schistosomum mansoni*.

In all infections by the *Schistosomidæ* there is some similarity in the pathological findings. The main findings, summarized, are:

(1) The deposit of the eggs which are found mainly in the submucous coat of the genito-urinary tract or the large intestine and rectum.

(2) Small celled infiltration with a consequent hypertrophy of the viscus at these areas.

(3) Calcification of some of the areas in which eggs have been deposited.

(4) Polypoid growths (this has not been reported for *Schistosomum japonicum*).

(5) The eggs are voided in an excretion of the host. (*Schistosomum hematobium*, by the urine, has terminal spine. *Schistosomum japonicum*, by the feces, has no spine. *Schistosomum mansoni*, by the feces, has a lateral spine.)

The most frequent complications of *Schistosomum hematobium* infection are vesical calculus and urinary fistula.

The most frequent complication of *Schistosomum mansoni* infection is probably biliary cirrhosis.

Eggs and adult parasites have also been reported in other parts of the body, as the lungs, etc., but as a rule they are found along the large intestine, and principally about the rectum and along the genito-urinary tract, principally in the bladder. Eosinophilia has been demonstrated in the cases infected with the *Schistosomum hematobium* by Douglas and Hardy[21] at the Royal Victoria Hospital at Netley. In a series of 50 cases in white soldiers returning from South Africa they found the averages to be: Eosinophiles, 16.48 per cent; polumorphonuclears, 44.58 per cent; monouclears, 12.52 per cent, and lymphocytes, 25.75 per cent. The cases, however, were all urinary cases. Balfour[22] also reports an eosinophilia in three of the same class of cases. All of my cases had an eosinophilia, but with other possible causes to account for it. Case I, however, shows an eosinophilia persisting several months after the Uncinariasis had been cured; Case IV, an eosinophilia of over 50 per cent persisting almost one year. Accepting the view that Intestinal and Genito-urinary Bilharziosis results from the different species of *Schistosomidæ*, the *Schistosomum mansoni* and the *Schistosomum hematobium*, respectively, it is quite probable that their effect upon the blood is the same. The parasite probably never directly causes anæmia.

THE SCHISTOSOMUM MANSONI (SAMBON, 1907).

THE EGG.

The eggs are found without difficulty in the feces when present. By mixing a small quantity of the feces with water in a conical glass and examining the sediment, or by mixing a loopful of the fresh feces with a drop of water on a slide, the eggs are readily found by examining with a low-power lens and a high-power eyepiece. They do not occur in the urine. Frequent examination of the urine with the centrifuge will exclude them from this excretion. They are oval inshape and of a pale straw color, and so transparent that the inclosed miracidium is readily made out. By measurements of a number of eggs have shown them from 112 to 162 microns in the long diameter. In breadth they measure from 60 to 70 microns. They are provided with a spine of from 15 to 17 microns in length and which is sharply pointed. This spine, although I have previously reported it at the juncture of the posterior and middle third of the shell,[44] is, from further measurements, more correctly located at the juncture of the last and third quarter of the egg. The spine is directed backward. When the shell is broken by the miracidium the rent is usually in the direction of the short diameter and curving toward the long diameter as it approaches it.

THE OVUM OF THE SCHISTOSOMUM MANSONI.

FIG. 3.—Showing the lateral spined egg with the miracidium. The different structures are shown diagramatically.

Lining the inside of the shell is the vitelline membrane. This membrane is usually made out without much difficulty and is clearest in the pole of the egg at which the cephalic extremity of the miracidium presents. Here there is usually a clear space between the membrane and the shell.

Within the vitelline membrane is inclosed a miracidium---a brownish membrane of granules in a high state of molecular vibration—and several clear, slightly opalescent bodies. The brownish membrane consists of a thin layer of granules which surrounds the whole miracidium. They are usually found in a high state of molecular activity in the matured eggs. The opalescent bodies are more frequently two in number, but I have found as many as five. They are of a somewhat hyaline substance and though of oblong dimensions, usually

saddle the miracidium so that the side view presents, giving them the appearance of oval bodies jammed between the miracidium and the shell. These bodies appear to be of the nature of food for the embryo, as in cases where the feces has been mixed with sand and kept for one or more days they are usually absent.

THE MIRACIDIUM.

The miracidium can be readily seen through the shell. For purposes of convenience in description it may be divided into a cephalic,

THE FREE SWIMMING MIRACIDIUM.

FIG. 4.—Showing the free swimming miracidium and the contractile property of its protoplasm.

intermediary, and caudal zone. The cephalic zone is readily identified by the oral papilla. It may be directed toward either the anterior or the posterior end of the shell. The terms anterior and posterior as applied to the shell refer to the spine. The spine is always directed backward upon the shell, and this end is therefore designated the posterior end of the shell, and the oral papilla was as frequently directed toward the anterior end of the shell as to the posterior. Surrounding the whole of the miracidium, excepting at the oral papilla, may be seen the long cilia. These cilia are probably strongest just behind the oral papilla. I have expelled the miracidium from the shell with its membrane complete and the swelling from the attempt of the cilia to perform their function has taken place at this point.

From the papilla may be traced the large œsophagus, which in a much dilated condition appears to extend to a viscus in the inter-

mediary zone. The viscus or stomach can frequently be made out as a large globule occupying the center or about the center of the miracidium. In the caudal zone may sometimes be traced two quadrilateral bodies. I have encountered these bodies in what appears to be different stages of their development. At other times I have been unable to find any trace of them. From the lateral sides of these bodies, on either side, may be found one or more lateral apertures. About the opening of these lateral apertures the brown granules are frequently found in a high state of vibration, but I have never seen any of these granules enter the opening. I have seen in my early studies what appeared to be similar openings in the caudal zone, but have been unable to confirm that finding since some of my early drawings. When the miracidium is freed from the shell about opposite these openings in the cephalic zone, there will develop five or six, more frequently five, clear vacuoles. If these vacuoles have any connection with the lateral appertures, they certainly do not develop in the appertures of the caudal zone. I have never seen these vacuoles swell and collapse as they do in certain forms of the ciliata.

With careful focusing, at about the juncture of both the caudal and cephalic zones with the intermediary zone, may be detected four circular sets of active cilia. The contractions may be made out with the miracidium still inclosed within the shell. The pulsations of the infundibular area which they occupy is at about the rate of 216 to the second. This is much slower than the rate of motion in the locomotor cilia, which vibrate perhaps at two or three times that rate.

The miracidium is made up of a highly contractile protoplasm. Both within the shell and when freely swimming these contractures can be made out. It is due to this property of contraction that the miracidium is enabled to burst its shell, and it is also the reason why the rupture is usually along the short diameter of the shell. When the miracidium is ready to leave the shell its protoplasm strongly contracts, the contraction ripping open the side of the shell.

From the stage of a free swimming miracidium until it appears as an adult fluke in the human host the life cycle of the parasite is unknown.

THE MALE.

For this description of the male I am indebted to Dr. P. Gutierrez-Igaravidez, chairman of the Porto Rico Anæmia Commission, and Dr. Charles Wardell Stiles, who kindly placed their specimens at my disposal.

Most of the specimens were in poor condition, owing to the effect of the preserving fluid, and the measurements of four of the parasites given here can only be relative.

The parasites were all of a sepia color, and not white, as in the case of the *Schistosomum hematobium*. The average length was about

8.43 mm. Both the caudal and cephalic extremities tapered slightly and were almost devoid of tubercles. The main body of the parasite was tuberculated, being studded with papular elevations. The cleft of the gyneacophoric canal extended from the ventral sucker to the tip of the tail. The oral and ventral suckers were close together, the ventral being the larger of the two. The ventral sucker is pedunculated and the anterior lip is the longer, the posterior being the higher. The ventral suckers in all specimens examined (10 in number) appear to be relatively larger than in the *Schistosomum hematobium*. Whereas in the latter the ventral sucker was equal to about one-half the diameter at this location, it was two-thirds or more the relative size in the *Schistosomum mansoni*. Just below the ventral sucker the body is constricted in some cases. The intestinal canal begins at the oral sucker. Just above the ventral sucker there are several saculations in the œsophageal tube. At the ventral sucker the œsophagus enters a bilaterally sacculated stomach from either side of which an intestine is given off. The bifid intestine continues for about one-half the length of the body of the fluke, when the two branches join and continue as one common canal to the tip of the tail. The genital organs of the male are located between the two branches of the intestine, just below the ventral sucker.

THE MALE SCHISTOSOMUM MANSONI.

FIG. 5.—The male *Schistosomum mansoni*. The oral and ventral suckers, and the gynæcophoric canal presenting.

A table of measurements is here given of four of the parasites:

Specimens.	1.	2.	3.	4.
Length of parasites	9.8	8.12	8.40	7.14
Average diameter	.28	.28	.336	.28
Largest diameter	.336	.35	.378	.35
Diameter oral sucker	.14	.098	.168	.112
Diameter ventral sucker	.25	.196	.238	.168
Distance between suckers	.472	.364	.378	.294
Tail tapers for	1.47	.98	.840	.7
Diameter tip tail	.091	.084	.056	.112

THE FEMALE.

I have seen only a fragment of a female. The male which I have described differs so little from the *Schistosomum hematobium* that it is quite possible that the female will also be found to differ but a very

little. This difference has already been explained by Fritsch and Looss to be the result of the orientation of the egg in the ootype and the different relation of the egg to the shell ducts.

The points of difference in the two infections are:

Schistosomum hematobium.	Schistosomum mansoni.
1. Eggs deposited mainly in the submucous coat of the genito-urinary tract.	1. Eggs deposited mainly in the submucous coat of colon, rectum, and in the liver.
2. Eggs are voided in the urine.	2. Eggs are voided in the feces.
3. Eggs have a terminal spine.	3. Eggs have a lateral spine.
4. Causes hematuria, polypoid growths of bladder, cystitis, pyelitis, vesical calculus, and perineal fistula, etc.	4. Causes at times colitis,[23] cirrhosis of liver,[19] abscess of the liver (Case VII), etc.
5. Male, milk white in color.	5. Male, darker in color.
6. Ventral sucker of the male in size about one-half diameter of the parasite at its location.	6. Ventral sucker of the male about two-thirds the diameter of parasite at its location.
7. Eggs are developed in the vertical axis of the ootype of the female.	7. Eggs are developed lying inclined from the vertical diameter of the ootype, the shell duct entering to one side.
8. This infection occurs in districts in which the other forms of infection are rarely reported, as in Cape Colony.	8. This infection occurs in districts in which the other infection is rarely reported, as in Porto Rico.

MEMORANDA OF CASES.

Case I.

Maria B., female, 9 years of age, born in Vieques, resided in Culebra for two years. Came under observation October 23, 1905. Symptoms: Complains of dizziness, with pains in head and attacks of unconsciousness; some pain in abdomen a little above and to the right of navel. Blood examination showed:

Poly	52.7
Lymph	23.8
Mono	7.6
Eosin	11.92
Trans	.34

Examination of feces showed *Schistosomum mansoni*, *Uncinaria americana*, and the *Trichocephalus dispar*. February 19, 1906, given 1 gram of thymol, became unconscious, so that I was unable to arouse her; remained in this condition about one hour. Pulse, etc., normal. She did not return for a long time, but was reported by her relatives as being completely cured of "fits," dizziness, pain—and in good health. May 12, 1906, many specimens of feces examined and found free of uncinaria; the other eggs, however (*Schistosomum* and *Trichocephalus*), were found. Urine negative, specimens examined centrifuged. May 14, *Schistosomum mansoni* in feces. September 15, 1906, examined again—feels perfectly well.

Hb	75
Reds	4680000
Whites	5200
Poly	56.75
Lymph	17
Mono	9.25
Eosin	19.5
Trans	2.5

Feces contain *Schistosomum mansoni* and *Trichocephalus dispar*.

March 4, 1907, reported by uncle as being free of "fits" and in good health. In Culebra and Vieques used well water and cistern water.

CASE II.

Michael B., male, age 30 years, born in Vieques, lives there at present. Came under observation May 15, 1906, complaining of general weakness, dizziness, pains in epigastrium, which were worse during wet weather.

Hemaglobin	80
Reds	4498000
Whites	4800
Poly	52
Lymph	9
Mono	7
Eosin	31
Mast	1

Examination showed in one slide *Schistosomum mansoni* 10, *Trichocephalus dispar* 11, *Uncinaria americana* 135. Urine negative; no history of hematuria.

Treatment for hookworm begun.

June 30, 1906, feeling better; feces contained *Schistosomum*, *Trichocephalus* and *Uncinaria*.

Hb	85
Reds	4544000
Whites	5200
Poly	45.8
Lymph	12.5
Mono	5.2
Eosin	36.5

This patient was reported as feeling better after second treatment for hookworm, and did not return to Culebra for further treatment. It is believed, however, that he still has a moderate hookworm infection.

Has drank in Vieques mainly well and cistern water.

CASE III.

Alcardia D., female, age 14 years, born in Vieques, resident of this island about two years, lived at Caguas, Porto Rico, about three years of early childhood. Came under observation June 18, 1906, for treatment of malarial fever. Sometimes has pain in the stomach; passes a little blood with stools once in three or four weeks. Dizziness at times. Blood examination:

Reds	5324000
Whites	6800
Hb	80
Poly	28
Lymph	38.4
Mono	7.6
Trans	1.2
Eosin	24.8

Examination of feces showed *Schistosomum mansoni*, *Uncinaria americana*, and *Trichocephalus dispar*.

Centrifuged specimen of urine negative.

In Vieques and Culebra always drank well water. In Porto Rico drank water of a small stream.

March 21, 1906, Victoria, a sister, reports Alcardia in good health and living in Vieques. She still undoubtedly has all three infections.

CASE IV.

Victoria D., female, age 18 years, born in Vieques, resident of this island for two years, lived at Caguas, Porto Rico, about three years of childhood, a sister of Case III, came under observation June 18, 1906. Complains of no definite symptoms and furnished specimen of feces because of request made after finding *Schistosomum mansoni* in the feces of the sister (Case III).

Blood examination:

Reds	4484000
Poly	21.1
Lymph	17.5
Mono	7.9
Eosin	53.3

Examination of the feces showed *Schistosomum mansoni*, *Trichocephalus dispar*, and *Uncinaria americana*. Treatment for hookworm recommended, but never returned.

In Vieques and Culebra drank well water. In Porto Rico the water of a small stream.

March 21, 1907. Came in on request. A little pain at times in epigastric region. A little blood in feces every three or four weeks. At times has headache and dizziness.

Reds	6472000
Hb	90
Whites	10388
Poly	10.36
Lymph	26.82
Mono	5.60
Eosin	55.28
Trans	
Mast	1.62

Urine.—Epithelial cells, amorphous urates, nothing else.

Feces.—One slide showed 1 *Schistosomum*, 1 *Trichocephalus*, 1 *Uncinaria*.

CASE V.

Bernidita D., female, age 8 years, born in Porto Rico, lived in Vieques for a while, resident of this island about two years, lived at Caguas, Porto Rico, about two and a half years of early life. Came

under observation June 18, 1906, complaining of no especial symptoms, and furnished specimen of feces upon request after examination of sister's feces.

Blood examination:

Hb	80
Reds	4824000
Whites	8000
Poly	26
Lymph	12.5
Mono	6.5
Eosin	54
Trans	

Feces showed *Scoistosomum mansoni* and *Trichocephalus dispar.*

Treatment for hook worm recommended, did not return, soon after moved back to Vieques.

No examination of the urine made. There is no history of hematuria. In Porto Rico drank the water of a stream; in Culebra and Vieques drank well water.

March 20, 1907, Victoria (Case III) reports Bernidita in good health.

CASE VI.

Santiago R., male, age 48 years, born in Fajado, Porto Rice, lived in Vieques for seventeen years, and has been a resident of Culebra for about seven years. An uncle of Case I. Came under observation February 25, 1906, with an attack of malarial fever and complaining of dizziness and pain in pit of stomach. Blood examination showed pigmented tertian parasites.

Poly	78.4
Lymph	1.8
Mono	12.2
Eosin	3.6

Examination of feces showed *Trichocephalus dispar* and *Schistosomum mansoni.*

He was treated for the hook worm, and since that time has been feeling in good health. Blood formerly present at times in the feces has been absent for almost one year.

Urine negative, specimen centrifuged.

The wife of this patient and the wife's mother (aunt and grandmother respectively of Case I) submitted specimens of feces for examination, which were negative for *Schistosmum mansoni.*

April 9, 1907, came under observation again to have a tooth pulled. Feeling in good health, the only sickness since last seen being a "boil on the back of the neck."

Examination of feces showed *Schistosomum* eggs.

Examination of blood:

Hb	80
Reds	4594000
Whites	4222
Poly	46.78
Lymph	44.7
Mono	5.26
Eosin	7.24
Mast	1.94

Centrifuged specimen of the urine showed only epithelial cells and detritus.

CASE VII.

Juan B., male, age 23 years, born in Vieques, and has lived in Culebra, Porto Rico, seven years. I have known this patient for over a year as a strong, healthy worker on a cattle ranch. About six month before this date Maria B. (Case I) had come to his house to live. He came under observation July 20, 1906, complaining of pain in right side and in right shoulder, with fever each night, and there was increased liver dullness over right lobe of the liver.

Blood examination:

Hb	95
Reds	4400000
Whites	7000
Poly	65
Lymph	18.6
Mono	12.8
Eosin	2.6
Mast	.48

Examination of feces showed many of the *Schistosomum mansoni* eggs, and a few *Uncinaria americana*. There was no history of dysentery or any other diarrheal disturbance, and abscess of the liver was diagnosed, probably a result of *Schistosomum* infection, and operation at once recommended. This he declined to undergo. The leucocyte count increased:

July 20	7000
August 2	11222
August 6	10700
August 14	13954
August 17	14633

During this period the patient complained of pain in right hypochondriac region, right shoulder, sweats each night, and fever, with progressive loss of flesh. The urine was repeatedly examined and was negative for *Schistosomum*, but showed both hyaline and granular casts. About August 17, 1906, he consented to go to the hospital for operation, and at about the same time he began to spit bloody material

which contained quantities of liver cells. At this time examination showed:

Hb	75
Whites	14633
Poly	64
Lymph	12.3
Mono	19
Eosin	2.5

He was operated upon in the Presbyterian Hospital, San Juan, Porto Rico, a large abscess of liver opened and drained, and returned to Culebra with abscess healed on December 16, 1906, when examination of feces showed the eggs of *Schistosomum* and *Uncinaria*. January 14, 1907, he again came under observation with cough and bloody expectoration which, upon examination, showed liver cells, crystals, blood cells, and numerous bacilli and cocci taking Loeffler's stain. He was again sent to the hospital and again operated upon for the abscess.

April 6, 1907, returned from hospital, abscess healed. Examination of feces showed *Schistosomum* eggs.

Examination of blood:

Hb	85
Reds	5840000
Whites	15110
Poly	52.5
Lymph	33
Mono	5.6
Eosin	7.34
Trans	.56
Mast	1.12

April 16, 1907, came to see me as I was leaving the island and informed me that he was again spitting a little blood.

At Culebra, where he probably obtained his infection, he has drank almost entirely rain water collected in a large cistern.

Case VIII.

Eugenia N., born in Vieques, has always lived there, age 28 years, in fairly good health. Came under observation February 6, 1907, with a slight attack of indigestion. She never returned for treatment, but her brother reports her in good health.

Examination of blood:

Hb	70
Reds	5384000
Whites	6666
Poly	28.9
Lymph	28.5
Mono	6.9
Eosin	12.2
Trans	3.4

Examination of feces showed *Schistosomum mansoni*, *Uncinaria americana*, and *Trichocephalus dispar*.

CASE IX.

Estaban J., 11 years of age, born in Vieques, and has lived at Culebra for seven years. Came under observation February 18, 1907, with the evidences of an advanced stage of anæmia, and complaining of a tumor in the abdomen. Examination showed an enlarged spleen, perhaps four times normal size, with a pendulous tumor at about the region of the umbilicus. He stated this tumor had existed for four years, and during that time he had been suffering severely from chills and fever, and at times the tumor became very sore, as at present. The deep femoral glands were found enlarged and very painful. His chills and fever have been getting worse lately. He states that at Culebra he has drank well water only.

CASE IX.

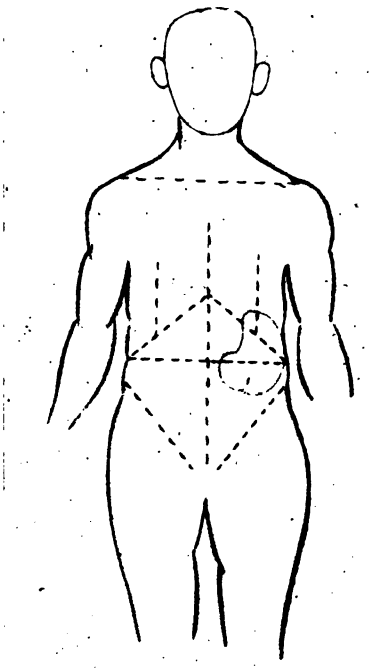

FIG. 6.—Showing the enlargement of the spleen.

Examination of blood at this time showed:

Hb	50
Reds	2104000
Whites	2420
Poly	50
Lymph	31.96
Mono	9.6
Eosin	4.7
Trans	27

Examination of feces showed the *Uncinaria americana* and *Trichocephalus dispar*. Treatment for uncinariasis and malarial fever begun.

Returned March 4, 1907, and examination of feces in one slide showed: *Uncinaria* 53, *Schistosomum* 7, *Trichocephalus*, 5. Treatment for uncinaria continued.

Examined March 12, 1907, one day after treatment, one slide showed 5 *Uncinaria*, 2 *Trichocephalus*, and no *Schistosoma*.

Examination of blood this date showed:

Hb	40
Reds	1544000
Whites	2200
Poly	44
Lymph	37
Mono	11
Eosin	6
Trans	1

megaloblasts, normoblast, marcro and microcytes and poikis.

Next seen March 19, 1907, and states tha fever has not recurred since treatment, and dizziness is less.

Blood examination:

Hb	60
Reds	11660000
Whites	1760
Poly	42.5
Lymph	38.33
Mono	9.16
Eosin	7.5
Trans	2.5

March 22, 1907, examination of urine, centrifuged, a few flat epithelial cells and detritus; no history of blood in urine.

Examination of feces: 23 *Uncinaria*, 5 *Trichocephalus*, 3 *Schistosoma*.

Examination of blood:

Hb	50
Reds	1672000
Whites	3540
Poly	54.1
Lymph	23.20
Mono	7.78
Eosin	7.79
Trans	2.2
Mast	.55
Maxcocytes	

March 24, 1907, gave two grams of thymol—intoxication. Estaban and father report passed large numbers of worms in feces. Feeling good. Feces of family examined. FATHER: *Uncinaria* 11, *Trichocephalus* 3. MOTHER: *Uncinaria* 20, *Trichocephalus* 6. BROTHER: *Uncinaria 23*, *Trichocephalus* 11, no *Schistosoma*.

March 28, 1907, pain in soles of feet and palms of hands; no dizziness; no fever; feeling much better. Feces showed two covers, *Uncinaria*, 11; *Trichocephalus*, 2; no *Schistosoma*.

March 25, 1907, feces of family again examined and negative of *Schistosomiasis;* received 2 grams of thymol.

March 28, 1907, feels well except for rheumatic pains in joint.

Feces on slide showed 11 *Uncinaria* and 2 *Trichocephalus* eggs; no *Schistosomum* eggs.

Examination of blood showed:

Hb	70
Reds	2610000
Whites	2666
Poly	47.39
Lymph	39.30
Mono	10.49
Eosin	2.31
Trans	.57

April 7, 1907, returned with rheumatic pains in ankles; dizziness and pain in stomach disappeared. No tenderness over tumor nor in groin.

Examination of blood:

Hb	68
Reds	3312000
Whites	8000
Poly	57.7
Lymph	29.7
Mono	9.14
Eosin	8.5
Trans	.56

April 8, 1907, received another dose of 2 grams of thymol, from which he was moderately intoxicated, and after which he voided a large number of worms.

April 14, 1907, feeling much better.

Hb	75
Reds	3102500
Whites	5800
Poly	53.33
Mono	10.34
Lymph	22.22
Eosin	12.59
Trans	.14

Feces: Five *Uncinaria* eggs and 1 *Trichocephalus dispar.* I left Culebra about this date.

CASE X.

Justina G., female, born in Vieques, age 14 years, has lived in Culebra two years, has drank well water most of the time here and in Vieques. Came under observation for treatment for "fits." The attacks have persisted for the past four years, and lately have been worse, coming on about every two days. She can tell when the attacks are about to come on, and they are somewhat epileptiform in character. She also states that she suffers at times with pain in the chest and abdomen, and from time to time dizziness. She also states that she has attacks of palpitation during the day.

Examination of the blood was made within ten minutes after one of these attacks and was as follows:

Hb	70
Reds	6584000
Whites	153600—(ear)
Poly	37.5
Lymph	25.5
Mono	17
Eosin	13.5
Trans	3

Examination of the feces the same date showed *Schistosomum mansoni* and *Uncinaria americana.*

She returned three days later, when another blood examination was made, which was as follows:

Hb	70
Reds	4232000
Whites	6000
Poly	28
Lymph	36.1
Mono	30
Eosin	4.6
Trans	.7

Treatment for hookworm begun. She reported back in eighteen days, stating that she was better and had had but two attacks since treatment began.

Examination of blood showed:

Poly	55.32
Lymph	24.66
Mono	6
Eosin	13.2
Trans	.66

Examination of centrifuged specimen of urine negative, showing only a few epithelial cells.

March 21, 1907, feces examined and negative—no ova found.

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ELEPHANTIASIS OF THE SCROTUM; ITS OPERATIVE CURE.

By Passed Asst. Surg. A. M. Fauntleroy, U. S. Navy.

Out of the notes submitted by Doctor Fauntleroy on the surgical operations performed by him at the United States Naval Station, Tutuila, Samao, during the year 1906, we have extracted his discussion of this feature of his work as being of particular interest to the Medical Corps in the light of tropical service.

From a numerical standpoint scrotal tumors have been the largest feature of the surgical work at this station. Out of a total of 222 operations performed during the year, 77 cases came under the knife for these elephantoid tumors, varying in size and weight all the way from 5 to 60 pounds. The surgical facilities at Tutuila, Samoa, are makeshift and primitive, but while stitch abscesses have occurred at times, and infection has resulted at rare intervals, due to the close proximity of the wound to the anus, the results have been uniformly good, and no cases of death have occurred. The mortality of the operations is said to be 5 per cent, but it is my opinion that the death rate should be practically nil where close attention is paid to the details of asepsis.

The preparation of the patient has a great deal to do with the result; in fact, it is all-important.

The preparatory technic.—Upon admission the patient is given a piece of soap and made to scrub well under a shower bath. The scrotum and pubes are then shaved and scrubbed thoroughly with green soap and water, followed by a soap poultice which is allowed to remain on over night. The patient is kept in a recumbent position, and the mass supported to secure gravitation of a certain amount of the contained fluid and blood and consequent relaxation. The next morning, the skin being softened, the scrubbing is repeated, followed by alcohol lavage and the application of a 1 to 3,000 bichloride compress, secured by bandage, which is allowed to remain on for six hours, the patient being operated on at 2 o'clock on the day following admission. No food is allowed the night before, and a soapsud enema is given one hour before operation.

Thorough scrubbing of the hands and arms, the latter for several inches above the elbow, followed by alcohol and immersion for two minutes in a warm 1 to 3,000 bichloride solution, prepares the operator and assistant, both of whom wear a gown and cap.

The operation.—The patient placed in the lithotomy position and all being in readiness for the operation, the bellyband part of the bandage is cut by an assistant, standing on the patient's right. The tumor is then lifted up by the same assistant and the scrotal part of the bandage cautiously slipped from under, while the scrotum is caught in a sterile towel by the operator who stands at the foot of the table. The scrotum and adjacent skin are now wiped with pads saturated with alcohol, followed by a liberal irrigation with a 1 to 3,000 bichloride solution. Meanwhile the scrotum is supported, and at the conclusion of this final cleansing a fresh sterile towel is placed beneath it. The abdomen is protected by a sterile sheet, while the thighs, legs, and table posts are protected by sterile towels.

No tourniquet is used at the base of the scrotum, as it not only has very little effect in controlling hemorrhage but its application and subsequent removal greatly endanger asepsis. Various writers on this subject recommend that rubber cord be applied in a figure of 8 of the scrotum and abdomen and then secured behind, near the anus, with two strips of bandage which pass up behind the sacrum to the bellyband. In this procedure the most elaborate measures would have to be taken to avoid contamination of the field of operation, and special assistance would be required, to say nothing of the needless consumption of time. The vessels which give the most trouble are deeply seated and the rubber cord would have little or no effect. It is true that at times there is considerable hemorrhage, but with plenty of haemostats at hand it is no trouble to catch the vessels as they spurt, and in some cases there is scarcely any bleediug at all.

The operation is essentially a plastic one, and no rules as to flap making can be laid down. A general outline of the operation is contemplated here with a view to giving certain underlying principles in regard to flap-making which may be deviated from as the case requires.

The tumor is usually pear-shaped and the penis obliterated. On each side of the base of the tumor, next the thighs, will usually be found sufficient sound skin to form flaps. In the great majority of cases the elephantoid tissue does not extend to the base of the tumor in front; in fact there is almost invariably from 2 to 2½ inches of sound skin available to cover the base of the penis when the tumor has been removed. As far as the penis is concerned, this would leave it covered only at its base if it were not a fact that the prepuce is long, being stretched out by the weight of the tumor, and after all elephantoid tissue has been entirely cleared away from it there is sufficient left to form the outer 2 inches of the penis covering. This gives a penis of respectable length, from 4½ to 5 inches, entirely covered with skin. With these facts in mind the incisions can be made, and it is best to map out beforehand with shallow incisions the flaps which are to be made use of in covering the penis and testicles. Care must be exercised in cutting these guiding lines "that they run through and include only absolutely sound skin, as by neglecting this precaution disease is very liable to recur in the scar or flaps."

The incisions I have adopted are as follows: A horseshoe-shaped incision is made beginning in the sound skin at the left side of the base of the tumor, about an inch from the thigh, and about on a level with what would be the base of the penis in health. This incision is carried in a gentle curve downward and inward so as to pass just below the opening of the penis on the tumor surface. A corresponding incision is made on the right side and joins the left incision just below the opening of the penis, completing the horseshoe incision.

Beginning on the right side above, and commencing in the outer extremity of the horseshoe incision an incision is made in the sound skin downward and inward in a gentle curve until the posterior aspect of the tumor is reached, when the incision is carried sharply backward and inward to the midline. A corresponding incision is made on the left side and joins the right incision in the midline.

These incisions are now deepened, at first freeing the penis by deepening the horseshoe incision above, care being taken not to wound the spermatic cord. The lateral flap incisions are now deepened above until the testicles are reached. These are usually embedded in the center of the tumor, one on either side of the septum, surrounded by a watery mass of fat-like tissue from which they can be easily stripped. Having accomplished this, the remains of the gubernaculum testi are divided close to the testicles and the latter freed and turned upward

A sound is now introduced into the penis and the septum of the scrotum divided fairly close to the sheath of the penis and all blubbery and fatty tissue cleared away. There is generally considerable bleeding here, but it is only a matter of a few seconds to pick up the bleeding points, which should then be ligated with catgut. Usually torsion suffices to control the superficial bleeding, but it may be necessary to tie.

The tunica vaginalis of one or both testicles will usually be found distended with fluid which can now be drained off with a trocar. The tunica is then slit up and dissected away from the testicle and cord and the entire wound irrigated with hot sterile salt solution.

After this attention is devoted to the penis by first freeing the prepuce from the horseshoe flap by means of an almost circular incision around and above the opening of the penis. This accomplished, the remainder of the horseshoe flap is dissected up and the entire penis freed. The base flap is now examined and whatever there is of elephantoid tissue removed. This, as already indicated, leaves a flap about 2½ inches long which can now be brought over the base of the penis and stitched with silk, or preferably silkworm gut, on the under side. The long prepuce, being freed of elephantoid tissue and trimmed with scissors, is stitched to the flap covering the base of the penis.

Beginning below, the lateral flaps are brought together with silkworm gut sutures leaving a small space below in the most dependent part for a drainage tube to be introduced later. As the new scrotum is thus formed the testicles are replaced and, when a sufficient number of sutures have been introduced to completely re-form the scrotum, the upper edge of the lateral flaps, which is now a V-shaped line, is sutured to the corresponding portion of the lower edge of the base flap above. This leaves a line of sutures which resembles the letter Y, the base of the penis being above the center of the two arms. Before the last sutures are introduced in the V-shaped portion, a fenestrated drainage tube is introduced from above downward. This is accomplished by passing a hæmostat into the opening in the dependent portion below, pushing it up to emerge at the opening above, grasping the tube, and drawing it into position through the new scrotum so that the lower end protrudes about an inch. Before the last suture is tied the scrotum is again irrigated through the upper wound with the hot saline solution.

The dressing consists in wrapping the new penis in sterile gauze, placing gauze pads over the scrotum, and on top of the latter a copious dressing of cotton. The penis with its dressing is now drawn through an opening in a piece of oil muslin or rubber tissue 6 inches square, to prevent the urine from soiling the dressing, and the whole is secured to the waist line by a double figure of 8 bandage.

This is not touched for three days, when the drainage tube is withdrawn. Three days after this the stitches are removed and the patient

put back to bed for another two days, when he is again re-dressed, and, if there has been no infection, the tissues will be found to be firmly enough united to allow him to walk sufficiently to police himself. The quickest recovery is expressed in a discharge from the hospital on the tenth day. The oldest man operated on was nearer 70 than 60, and the youngest was 18.

Comment.—In performing this operation the operator, in securing skin covering, will have to be guided by the extent of elephantoid infiltration, and, as no two cases are alike, it will be necessary, so to speak, to cut the garment to suit the cloth. In some cases it will be found necessary to loosen up the skin of the upper inner aspect of the thigh near the base of the tumor in order to obtain sufficient covering. In some cases it is more desirable to circumcise after recovery from the first operation than to complete the operation at one sitting. Other points will arise which will call for the exercise of all the powers of the plastic art. In 60 per cent of my cases it was necessary to remove one testicle because of infiltration, enlargement, congestion, or cystic degeneration of the organ. Not infrequently it will be necessary in addition to the hydrocele to ligate and clear away extensive varicocele, and the not unusual complication of hernia and undescended testicle must not be overlooked. The average time occupied in performing this operation was one hour from the time the patient was under the anæsthetic till he was in bed.

PRELIMINARY REPORT ON CORYNEBACTERIUM AUREUM (LEE)—A PSEUDO-DIPHTHERETIC ORGANISM PRODUCING MARKED ORANGE PIGMENT.

By ANDREW E. LEE, Assistant Surgeon U. S. Navy.

As the organism herein to be described bears every characteristic of the Corynebacteria, according to Lehmanno and Neumann, namely: culturally growing and staining as bacteria, microscopically; rods, frequently presenting a clubbed swelling at the ends showing irregular staining, and presenting in many cultures constantly true branching forms, I feel justified in placing it in the class of Corynebacteria.

SOURCE.

This point is both an interesting and perplexing one. A culture tube of pigeon-blood agar was brought to the laboratory by a practicing physician of Washington, demonstrating the influenza bacillus, which he had obtained from a guinea pig that had been inoculated with cerebro-spinal fluid of a child dead from cerebro-spinal meningitis. Transfers were made onto blood-streaked glycerin agar. At the end of twenty-four hours it was examined with reference to the presence

of the influenza bacillus, and was found to contain two organisms—a chromogen and a nonchromogen.

The physician's stock-culture tubes also showed this condition at this time, and as I was only interested in the pigmented organism, I separated it in pure culture.

The above offers two possibilities as to its origin—

(*a*) Contamination from pigeon's blood.

(*b*) Contamination from guinea pig's blood.

MICROSCOPIC APPEARANCE.

Smears made from a twenty-four hour blood glycerin-agar slant show mostly long slender rods, varying in length from 1.5μ to 4μ, with a tendency to club-shaped endings, parallelism and involution forms.

Smears from a forty-eight hour growth show a much greater degree of clubbing, branching, and other involution forms; all of these are brought out most strikingly from blood-streaked glycerin agar. Its pleomorphism is a very marked and constant characteristic.

Motility.—Not present.

Staining properties.—Stained by all the aniline dyes and by Gram's method. Decolorized by acid alcohol.

Its morphology when stained with Loeffler's methylene blue resembles very closely that of bacillus diphtheria, showing the characteristic irregular staining or banded appearance, parallelism, clubbed ends, and branching forms. The same is seen with dilute carbol fuchsin.

Neisser's metachromatic stain—negative, although when stained the first day was doubtfully positive, but never have I since been able to repeat the stain successfully.

	Growth twenty-four hours.	Forty-eight hours.	Seventy-two hours.	Ninety-six hours.
Blood streaked glyc. agar plates, streak method.	Minute pin point dewdrop-like colonies, glistening. Microscopically: finely granular irregular border. No pigment.	Slightly larger, more ground-glass appearance. No pigment.	Same. No pigment	Developing yellowish-orange pigment. Colonies slightly larger and opaque.
Blood glyc. agar slant	Fine dewdrop-like colonies; remaining discreet. No pigment.	Same. No pigment	Colonies slightly larger. No pigment.	Discreet small yellowish colonies finely granular, rough edged peculiar striated appearance to individual colonies, a constant characteristic.
Plain agar slant	Very scant growth. Few dewdrop colonies.	Same	Same	Same.
Gelatin stab	No growth. No liquifaction	Very slight growth	Surface growth. Orange pigment.	Surface covered with uniform growth, no growth along stab. Deep orange-yellow pigment. No liquifaction.
Potato	No visible growth.			
Bouillon	Clear; slight granular sediment	Slightly cloudy	Same	Same.
Blood serum				Luxuriant brilliant orange-yellow colonies, discreet, raised, glistening.
Fermentation tube. Glucose bouillon.	Negative.			
Milk. Litmus	Negative.			

ACID PRODUCTION.

To n 20 NaOH.

Organism. In 5 c. c. glucose bouillon.

Corynebacterium Aureum. After twenty hours, 0.5. After forty-eight hours, 1.6.

PATHOGENESIS.

For guinea pigs, negative. Injected 1 c. c. of a bacillus emulsion subcutaneously.

LITERATURE.

In looking over the literature of Corynebacteria, I find one reference made in the Fifteenth Annual Report of the State Board of Health of New York, 1904, by "Wm. H. Park, Inspector, etc., Diphtheria," of a pseudo-diphtheretic bacillus resembling somewhat in a slight degree my organism.

CLINICAL NOTES.

EPIDEMIC BRONCHIAL ASTHMA OF GUAM.

By Passed Asst. Surg. G. F. FREEMAN, U. S. Navy.

Doctor Freeman has submitted some very interesting clinical notes taken from his professional experiences during a tour of duty at Guam in 1904 and 1905. Out of these we have selected the portion discussing epidemic asthma, as the disease in epidemic form is so novel in character that any report throwing light upon its various phases must find a merited place in medical literature.

Other medical features of Guam, including gangosa or rhino-pharyngeal mutilans, intestinal parasites, leprosy, and yaws, have been and are being discussed, but we have heard comparatively little on the subject which is considered in the following notes, and it is in the belief that value attaches to them that they are presented. Doctor Mink was on duty at Guam during the reported epidemic, and to him we are indebted for the appended statement of the post-mortem appearance of the lungs.

Recent information from Guam advises us of the occurrence of another epidemic, including some 350 cases, and we will look for further reports upon this interesting disease.

At Guam "epidemic asthma" is both endemic and epidemic, and the large number of cases occurring at times renders it a serious problem for the medical officers, and accounts for a good per cent of the mortality. During an epidemic which swept over the island for ten days and then practically disappeared, from May 16 to May 26, 1904, these notes were taken. One hundred cases of those occurring during this epidemic were recorded, with brief comments on each case. When it is considered that on one day, May 19, I saw 115 new cases myself, it may easily be understood that clinical records could not be very complete. These cases were observed at Agana, the capital city of the island, which is 5 miles from Piti, the port of entry. Agana is itself on the coast, and for the most part only a few feet above the high-water sea level. The soil is of coral formation, and at times the coral dust from the roads and land is very irritating to the bronchial mucous membrane. Several days prior to the epidemic at Agana a few cases with some deaths occurred at Sumay, across the harbor from Piti and about 10 miles distant from Agana. It is to be remarked that at this time of the year (May) the prevailing wind would tend to carry any dust or infection in the opposite direction, and infection of Piti and Agana from Sumay, therefore, would not be possible if the disease were carried by the wind. There

is, however, a constant communication from Sumay across the harbor (San Luis d'Apra) to Piti, and thence by road to Agana, passing through some small hamlets. The epidemic had its greatest force at Agana, which it reached after having swept Sumay, then Piti, then the small hamlets on the road to Agana from Piti. After Agana the epidemic passed out into the ranch district, to the east of Agana, still traveling against the prevailing wind. In Agana the districts along the small Agana River, which runs through the town almost parallel with and near the seacoast, were more severely attacked at first. In a few days, however, the epidemic was general over the town. These circumstances are mentioned because at the time it was considered that this epidemic was not carried by traffic or the wind, but resulted from some local influence, as the climatic conditions or the irritating action of the coral dust, for example. If this is true, then in explanation of the fact that the epidemic traveled over the island in such a systematic manner and did not appear simultaneously at any two places it must be considered that the conditions exciting its development simply happened in the sequence named. The route of future epidemics may throw some light on this point. At the time in question the "old inhabitants" could give no definite history of the spread of similar epidemics.

The day the epidemic began I saw all the cases in the city, 54 in number, but after the first day it was impossible for one medical officer to see all the cases, and the surgeon who had the "native practice" had to turn part of it over to the other surgeons. All the medical officers worked night and day, but it was my lot to have the more thickly populated districts, and perhaps I saw more cases. The dates and the number of cases seen were as follows: May 16, 54 cases (these figures include only the new cases); May 17, 34; May 18, 110; May 19, 115; May 20, 71; May 21, 24; May 22, 16; May 23, 5; May 24, 5; and May 25, 3 cases; making a total of 442 cases visited. Some cases occurred on May 15, but at that time such a large epidemic was not anticipated. Each day the old cases were visited in addition to the new cases, and thus the daily number of cases actually seen was at times about 300. A conservative estimate of the number of cases occurring in the entire island would be about 1,000, or about one-tenth of the entire population. Of course some of these cases living in distant parts were never seen.

Each case lasted from three to four days. The calls for visits occurred mostly in the daytime, but enough calls came in the night to make sleep impossible. After the first two days there were so many calls to make that patients were visited by streets, the new cases being seen and the old ones visited on the same round.

The disease was observed but once in a foreign child, which case was that of a boy of 4 years from the United States. There were no

cases among foreign adults. The larger per cent of cases occurred in the very young. The oldest age recorded as having the disease was 84 years. Some cases in the aged had never had the disease before. In many of the cases there was a history of several previous attacks.

The following is a sample of the notes taken in cases and they were of necessity very brief:

May 17, 8 p. m., St. Nicholas, Maria, 1 year 3 months. Resides, San Ygnacio (ward). Present illness, twenty-four hours. Respiration, 48; pulse, 160. Grave. Two cases next door. Lumbricoid worms one month ago.

Previous history: No asthma.

Family history: Three in family have had asthma. (The temperatures were slight and were not recorded.)

Treatment: Powders of "calomel, ipecac, and soda," and syr. of ipecac with tr. opii camph.

May 18, passed lumbricoid worms.

May 19, convalescing.

Of these 100 recorded cases the mortality was 3 per cent; all children. This I consider a fair average for an epidemic of such severity. Many cases did not call medical aid until the patients were practically moribund, and some patients were brought from the ranches in extremis to die in a few hours.

The etiology of the disease is obscure. As previously stated, it is both endemic and epidemic at Guam. It seems, from the present epidemic and from the history obtained from the inhabitants, to occur as an epidemic at the change of seasons, from the dry to the wet, or when the wet season changes to the dry again. The atmospheric conditions seem to produce it or favor its development, if other specific cause is to be assigned, and the coral dust may act as an irritant. Some of the natives believe it to be a "hay fever," but this could not be corroborated. It seemed more like an epidemic of influenza with asthmatic symptoms. It certainly does not appear as a simple neurosis. The breathing was typical of bronchial asthma, and the sonorous râles could often be heard before entering the house. No pneumonic process was found clinically. Respiration becomes very rapid and the pulse in children becomes so rapid that it is difficult to count. The expectoration is slight, whitish, and viscid. The sputum examination gave no light on the etiology. The Chomoros, as a race, are prone to affections of the lungs, bronchitis, asthma, and tuberculosis. They live, moreover, in a most insanitary manner, and at night shut their houses so tightly that fresh air can not be obtained, several sleeping in one room under those conditions—a custom born of ignorance and in the belief that the night air brings disease.

The mortality of what were termed the "fat pale babies" was severe, and after seeing many cases at Guam this peculiar type of asthmatic received a more unfavorable prognosis. As the inhabitants are fected with intestinal parasites, the cases are complicated. Very

few cases treated with santonin fail to pass lumbricoid worms. As a usual thing the lungs at autopsy are what the "practicante" called the "white lung," and this had been noted in many cases. There was much viscid tenacious mucus in the lungs and hyperemia in places. Two cases are selected from notes of autopsies:

Case 1.—Maria, A. Y., Chomora. Clinical diagnosis, asthma. Age, 2 years. Sick, forty-eight hours. External appearance, emaciated. Many lesions of yaws. Excoriations and ulcers at anus. Liver is much enlarged, 3 inches below the costal margin. Kidneys, slight ecchymoses, cloudy swelling. Spleen small. Heart normal, antemortem clot, much fluid in pericardium. Lungs: Upper lobes emphysematous, frothy, crackling under pressure. Lower lobes, hyperemic. The right lower lobe has small pus focus and congestion, as of croupous pneumonia. Diagnosis: Yaws and asthma.

Case 2.—Maria F., Chomora. One year 4 months. External appearance, pale, well nourished. General scaling, eczema, as of syphilis. Hair, one-third lost. Ulcers on face. Some fluid was found in the pericardial cavity, as of an inflammatory product. Fluid in the abdominal cavity, as of peritonitis. Liver 3 inches below the costal margin, the left lobe being much enlarged. No abscess. Lungs: Areas of red congestion, lung as a whole "white and frothy." Small abscess, left lower lung. Fluid in pleural cavity. Heart, large, pale. Pancreas, large, tubercular nodules on surface and in substance. Kidneys, normal. Diagnosis: Asthma.

Most cases respond to treatment readily, and from being in a very serious condition are well in twenty-four hours. On the other hand, cases may die in the first twenty-four hours. The routine treatment comprises a purge and counter irritation to the chest (turpentine stupe) and a large dose of opium in some form. Belladona combined with the opium seemed to help the extreme dyspnœa. Tr. opii camphorata was much used, and a very large dose in some warm or hot drink was efficacious. Ipecac was also used with the above drugs, but the details of treatment were the same as in bronchial asthma and will not be noted at length. The prescriptions for these cases were numbered and the directions would be indicated by a letter. Thus: ℞ #34 oz. III (C) signified the dispensing of 3 ounces of mixture 34, which was the asthma mixture most used, and "C" signified that a teaspoonful (cucharita) should be taken every three hours. Numbering prescriptions and lettering the directions was a necessity on account of the large number written each day for certain diseases having a routine treatment. The statistics of this epidemic are far from complete, but these notes represent all that could be gathered at such a busy time. They give, however, some idea of epidemic asthma as it appears at Guam.

A NOTE ON THE PATHOLOGY OF THE LUNGS IN EPIDEMIC ASTHMA OF GUAM.

By Asst. Surg. O. J. MINK, U. S. Navy.

The sputum was scanty, white or a very pale yellow, thick, and very tenacious. It consisted of mucus, leucocytes, and flattened epithelial cells, probably from the mouth. The organisms were the usual mouth bacteria. Tubercle bacilli were never found.

The only pathological conditions noted at autopsy were in the chest. The heart was dilated, often hypertrophied and engorged with blood. The lungs were usually adherent either at the base or apex, and very often in both places. The adhesions varied from fresh, fibrinous and easily torn threads to the firm, connective tissue bands which were so strong that the lung tissue was torn when an attempt was made to separate the adhesions. All of the cases showed a lobar congestion, the affected lobe being a dark purple color. In one case the right middle and lower lobe and the left lower lobe showed this condition. The congested lobe is soft, friable, and tears easily. The cut section exudes a bloody froth. A left pneumothorax was also present. Those lobes not showing a uniform congestion often showed small areas of dark purple congestion. This congestion was not more marked posteriorly than in other parts of the lung. The lung tissue about the bronchioles appeared normal, but the bronchioles were filled with a muco-purulent secretion which was much thinner than the expectorated material. This muco-purulent secretion was also found in the bronchi and the lower part of the trachea.

MEDIAN CERVICAL FISTULA.

By Surg. F. L. Pleadwell, U. S. Navy.

An ordinary seaman, age 21 $\frac{5}{12}$ years, was admitted to the United States naval hospital, Yokohama, Japan, on September 18, 1905, with a median cervical fistula. He stated that this fistula had existed since early childhood, not knowing at just what age it had appeared, but he remembered being told by his parents that it had followed the rupture of a small tumor situated in the middle line of the neck a "short distance below the Adam's apple" when 5 or 6 years of age. Owing to the rather unsightly appearance of the scar following this rupture and the annoyance caused by the more or less frequent dribbling of fluid from the fistulous opening which remained, several attempts to effect its closure had been made before his entrance into the service, but without permanent success. On admission the patient presented, in the median line of the neck, on a level with the cricoid cartilage, and over the usual location of the isthmus of the thyroid, a small rounded opening, from which there exuded a clear fluid having the appearance of saliva. The fluid was observed to flow rather more freely during and just after eating. When this fluid was tested for potassium sulphocyanid, a normal constituent of the saliva, the characteristic reaction resulted. The fistulous opening presented near the apex of a triangular-shaped depression formed of cicatrical tissue, which by contraction had been drawn into finely corrugated folds. (See fig. 1, where "a" indicates the original opening of the fistula.)

A fine probe inserted into the opening passed upward and backward to a point posterior to the body of the hyoid bone for a distance of 1¼ inches. Beyond this point farther passage was resisted. To verify the suspicion that the condition presented by the patient represented a compara-

FIG. 1.—Showing situations of fistulous openings.

tively rare anomaly known as thyro-glossal fistula, resulting from a persistence of the embryonic thyro-glossal duct or tract, the following procedure was adopted: An aspirating syringe was filled with a solution of methylene blue and fitted with a needle which would enter and

fit snugly within the fistulous opening. This solution was then injected into the fistula under moderate pressure, the base of the tongue meanwhile being observed by means of a laryngeal mirror. The colored solution could easily be seen to emerge from the base of the tongue in the region of the foramen cecum, and the patient complained of a bad taste. Such a procedure demonstrated the existence of a fistula or duct leading from the foramen cecum of the tongue to the skin in the neighborhood of the isthmus of the thyroid gland.

The presence of a distinct communication between the foramen cecum of the tongue and the isthmus of the thyroid represents a persistence of the embryonic condition. In the early embryo the thyroid is represented by a small bilobed vesicle with a pedicle or offshoot extending toward the tongue. Later the gland is found to have developed into two lateral lobes with a connecting isthmus, the pedicle having disappeared. A persistence of this pedicle gives rise to various anomalous effects in this region, one of which is the condition presented by this patient, where the pedicle doubtless persisted, and became a tract or a well-defined duct, within which secretion accumulated, forming a cyst, which later opened spontaneously through the skin at the level of the thyroid isthmus, and left a fistula which never closed. Such a cyst or tumor is often opened surgically, its real character not being suspected, with the same result, viz: a permanent fistula. The rarity of the condition and the fact that its apparent cure was effected led to its being reported at some length. As the patient had been subjected to several operations (he thinks there were three), and had in one of them, he states, "been nearly killed by the chloroform," he would only agree to further operative procedure if it could be done without resorting to general anæsthesia. Therefore an attempt was made to dissect out and close the fistulous tract under Schleich's infiltration anæsthesia. Very little pain resulted when the tissues were thoroughly infiltrated with the fluid well in advance of the dissection. The opening was first enlarged to permit the passage of a grooved director to the point where resistance to the passage of the fine probe was previously encountered, which point corresponded to the posterior surface of the hyoid bone, in a line drawn from the opening in the neck to the base of the tongue. The intervening tissues were then divided by careful dissection, laying open the whole fistula to this extent, indicated by the director as a guide. It proved impossible to follow the fistula to a higher point without dividing the attachment of one side of the tongue so that above this point the tract could not be excised. The fistulous tract was then dissected out, the depth of the wound curetted and closed by deep sutures of fine silk-worm gut. Primary healing took place, but was followed by a slight bulging of the upper portion of the wound and reformation of a small fistula at this point (fig. 1-b). This eventually healed and when the patient left

the hospital two months later there was no recurrence of the trouble, and both fistulæ were entirely closed.

DIAGRAM OF THYROGLOSSAL DUCT AND ITS RELATIONS.

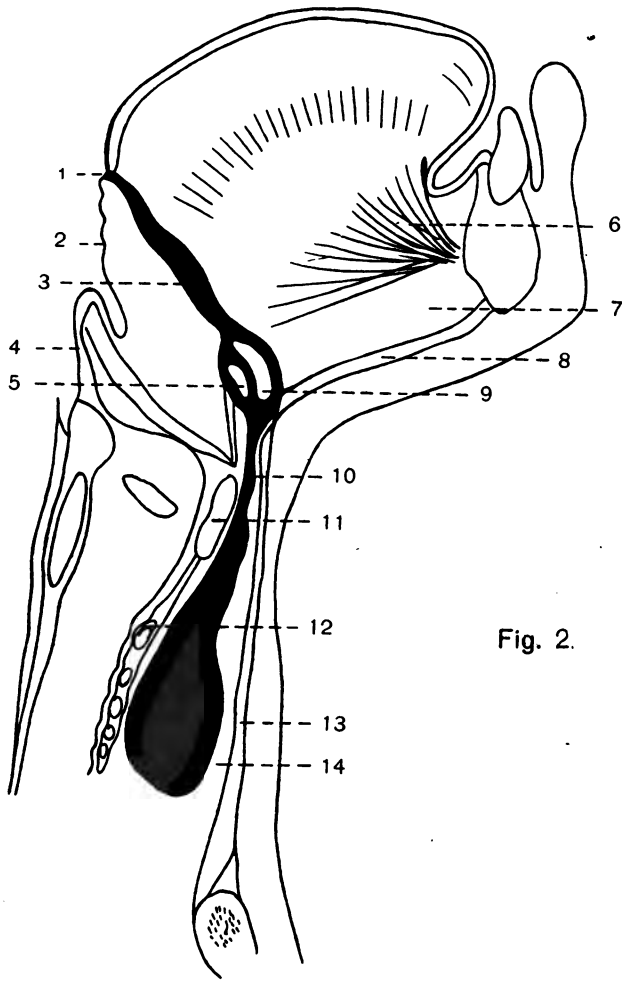


Fig. 2.

1. FORAMEN CECUM
2. LINGUAL TONSIL.
3. THYROGLOSSAL TRACT ABOVE HYOID BONE.
4. EPIGLOTTIS.
5. THYRO-HYOID BURSA.
6. GENIOHYOGLOSSUS MUSCLE.
7. GENIO-THYROID MUSCLE.
8. MYLO-HYOID MUSCLE.
9. HYOID BONE.
10. THYROGLOSSAL TRACT IN FRONT OF THYRO-HYOID LIGAMENT.
11. THYROID CARTILAGE.
12. CRICOID "
13. STERNO-HYOID RAPHE'.
14. ISTHMUS OF THYROID GLAND.

Figure 2 gives a diagram of the anatomical bearings of a thyroglossal tract and its relation to other structures.

A CASE OF GANGOSA IN A WHITE MAN.

By Surg. E. R. Stitt, U. S. Navy.

So far as I can ascertain from the literature of gangosa or rhinopharyngitis mutilans, there has never been reported a case except among the natives of Guam or the Fiji Islands, or possibly Panama (Forsyth).

As a matter of fact it has been observed that even the children of unions between the white and native races have appeared to enjoy an immunity from this disease. This is considered by McLean and Mink to be due to the better hygienic conditions of their life.

The reporting of a case of gangosa in a white man should, therefore, be of interest, not only for its rarity but as offering a possible danger to our naval force serving in Guam.

While attached to the United States naval hospital at Canacao I was very much interested in a case which had been received from the naval station at Olongapo, with a diagnosis of fistula. The fistula was in the median line of the hard palate and connected the mouth with the nasal fossæ. The papers relating to the case stated that the lesion was probably of syphilitic origin, as a history of a sore on the penis five or six years previously had been obtained. The statement was made, however, that there was no history of secondary symptoms, and that there were no signs to indicate that the man had syphilis other than the fistula.

During the five months he was under treatment at the naval hospital, Canacao, the disease progressed steadily but slowly, and this, notwithstanding vigorous specific treatment with potassium iodide and hypodermic injections of mercury had absolutely no effect on this case, although syphilis almost invariably was greatly benefited if not cured by this treatment.

While this patient was in the hospital, Assistant Surgeon Smith, U. S. Navy, and I were very much interested in examining syphilitic lesions for the treponema pallidum, and smears and scrapings from this case were frequently examined. I may state, that, without exception, these examinations were negative as to spirochætæ and to other organisms which might have been considered of interest from an etiological standpoint.

Clinically the man had an oval opening in the hard palate in the median line, the margins of which were of dense cicatricial tissue.

About two months after his admission to hospital he complained of a sense of discomfort about the fistula, and upon examination a projecting mass was observed, which was removed by the forceps. This proved to be a spongy, carious piece of bone the size of the terminal phalanx of the little finger, which was the remains of the vomer and adjacent bony structures. Considerable disfigurement resulted, but

active ulceration seemed to have stopped. The voice in this case was most characteristically snuffling and muffled; indeed the clinical feature was as marked in this case as in any of the cases of gangosa I observed subsequently at Guam. The fact was recognized at Canacao that the disease resembled the descriptions of gangosa, and there was a strong suspicion as to the nature of the disease, but as none of us had then seen gangosa, such a diagnosis was not made.

Treatment apparently failing to benefit the patient, he was recommended for discharge from the service.

Some months later I visited Guam for the purpose of studying gangosa, with a view to investigations as to its etiology.

As stated in my report to the Surgeon-General, I was unable with any method of staining (using principally Giemsa's stain and acid fast staining methods) to find any probable causative organism—findings similar to those obtained in the case at Canacao.

Knowing that the white man in question had been for several months in Guam prior to going to Olongapo, and recognizing that clinically his case resembled that of the 40 or 50 cases of gangosa I studied while at Guam, I made careful inquiries as to the man's mode of life. It was learned that he had been most dissolute, and that he had associated with the natives more intimately than had any other white man on the island. The information was also elicited that the natives with whom he had especially been familiar had gangosa cases in their family.

Later on, when visiting Olongapo, I learned from Surgeon Grow that the fistula was preceded by a membraneous patch which in an astonishingly short period of time was replaced by an ulceration, which in a few days resulted in the fistula for which he was sent to the United States Naval Hospital, Canacao, P. I.

From the above it will be seen that we have a complete history, including contagion, of a case of gangosa as described in the articles written by Leys, Arnold, McLean, and Mink. In my opinion it was undoubtedly a case of gangosa.

TREATMENT OF PNEUMONIA (LOBAR) BY QUININE—REPORT OF A CASE.

By Surg. D. N. CARPENTER, U. S. Navy.

Patient, a former private, United States Marine Corps, found in his room at Bremerton with a temperature of 103.4°, pulse 120, and respiration —35. Examination revealed a typical lobar pneumonia of the right lung (middle and lower lobes). His pulse was intermittent and of poor quality. Personal habits bad, and an alcoholic history. Sputum bloody, and contained pneumococci.

The Galbraith method of using quinine in pneumonia was tried in this case, and the results were excellent. There was every reason to believe the case would be a serious one, yet within twelve hours after admission the symptoms were mild. There was no evidence of cinchonism until the third day, when the patient complained of deafness, and the dose was diminished. Tinctura ferri chloridi (10 minims every two hours) was continued until convalescence. One hundred grains of quinine was given the first twenty-four hours, 80 grains the second twenty-four hours, 50 grains the third day, and 10 grains the fourth day. There was no distinct crisis. A rise of fever on the evening of the third day was due to acute pleuritis, with a marked friction rub. After the temperature became normal there was delayed resolution, taking three days to clear entirely.

The criticism of this treatment, as shown in this case, was the violent vomiting which occurred from one to three hours after taking the larger doses of quinine. There was no vomiting from the 10-grain doses.

A CASE OF APOPLEXY SIMULATING OPIUM POISONING.

By Asst. Surg. W. D. Owens, U. S. Navy.

This case is of interest in showing the difficulty that may be experienced in making a differential diagnosis between opium poisoning and apoplexy when the nucleus of the third nerve is involved.

The wardroom steward, a Chinaman, was reported sick at his home in Shanghai, not having returned from liberty. When seen the patient was in deep coma.

The antipathy of the Chinese against foreign medical interference rendered the subjective symptom negative, or to be taken "cum grano salis."

The objective symptoms elicited were as follows: Pupils minutely contracted with no irregularity. The respirations were 12 to the minute, regular and without distress, the skin moist, the face and lips livid, and the temperature normal. The pulse was regular, of good tension, and 70 to the minute. The reflexes were abolished; urine examination showed a trace of albumin.

The possibility of the case being one of apoplexy was constantly in mind, but a rigid examination made to elicit signs of hemiplegia was of no avail.

When one considers this typical group of symptoms in conjunction with the fact that the patient was a Chinaman, and more than probably addicted to opium, the diagnosis seemed positive. In two days the coma subsided sufficiently for signs of hemiplegia to appear, and the diagnosis of apoplexy was readily made.

WOOD ALCOHOL POISONING.

By Surg. H. E. ODELL, U. S. Navy.

Among the cases of poisoning which we are constantly encountering in the Navy, wood alcohol holds a prominent place. It is well known that some members of the enlisted force go to any lengths to obtain intoxicating drinks, and the following cases are illustrative and instructive. With such examples before us, it behooves all medical officers to be on guard for the recognition of and to improve every opportunity to warn his shipmates against exposing themselves to such direful accidents.

In the afternoon of October 26 and during the day of October 27, 1906, T. F. C., J. F. W., and N. C. P., United States Navy, with other members of the ship's company, drank a quantity of a mixture of bay rum and water. The bay rum had been made up with wood alcohol.

At about 2 p. m. October 27, N. C. P. reported at the sick bay evidently under the influence of liquor. He was questioned as to what he had been drinking, but would give no reply at the time and was confined. At about 4.20 p. m. the master at arms reported that a man in the "brig" was sick and needed attention. Upon going to the "brig" I found T. F. C. in a bad state of intoxication, but could get no information from him. I gave him a hypodermic injection of morphine (gr. $\frac{1}{16}$), and as soon as it was administered attempted to count radial pulse, but it could not be felt. A hypodermic injection of strychnine sulphate (gr. $\frac{1}{15}$) was made up immediately and administered. The patient was placed in bed and hot water bags applied, but his condition did not improve and he did not react to either medicine. Respirations ceased at about 5.30 p. m., and artificial respiration was carried on until 5.59 p. m., when the heart action ceased and the man was dead.

While working over T. F. C. it was learned that these men had been drinking bay rum and water. It was, however, appreciated that this was wood alcohol poisoning before the information was obtained.

J. F. W. and N. C. P. were brought in and their stomachs were washed with warm water and hypodermic injections of strychnine and digitalis were administered, but these measures did no apparent good, and they died at 4.32 a. m., and 6.52 a. m., October 28, respectively. No post-mortem was held.

A CASE OF ANEURISM OF THE THORACIC AORTA.

By Passed Asst. Surg. I. S. K. REEVES, U. S. Navy.

The obscure symptoms and difficulty in diagnosis of this case make it one of sufficient interest to report.

J. C. H., ordinary seaman, United States Navy, was admitted to the United States Naval Hospital, Chelsea, Mass., July 5, 1906, from the U. S. S. *Mayflower*. At the time of his entry he was accompanied

by a hospital ticket on which the diagnosis "myalgia" appeared, and the following notes were made:

Patient has developed the above trouble during his service aboard this ship. The frequent attacks of muscular pain and the persistence of present one leads one to suspect that there may be another inflammatory process present. He has lost much in weight and strength. Appetite is very poor and general condition is much below par. There is a lateral curvature of spine at site of pain, but no tenderness of vertebræ is evinced on examination. Has had no temperature. Urine normal.

There was no family history obtainable, as the patient stated that years ago he lost all track of his relatives. He stated that so far as he knew he had never been sick, and specific history was not obtainable, nor were there any signs of the same. The general appearance of the man was that of an honest fellow, extremely anxious to give any information that would aid in the cure of his disease, and it is believed that, had he suffered specific disease, he would have given the history of such without hesitation.

On entry of the patient into this hospital the following history of the case was obtained: Though a native of Philadelphia, where he was born in 1881, he became a cowboy in the West when 16 years old and followed that occupation until he enlisted in the Navy, January 3, 1906. The patient's health had been good up to that date, but according to his statement his last illness appeared shortly afterwards. Slowly increasing pain in the lumbar region of the back, followed by spinal curvature in that region, were the only signs of disease. Various forms of treatment to relieve the pain gave no relief. General debility, increasing emaciation, and insomnia were the distressing symptoms during the months of May and June of 1906.

As the result of careful examination here on the day of admission and few succeeding days, the following signs and symptoms were found: Marked emaciation, pallor of the skin, bright sunken eyes, muscles of the abdomen and chest in tonic contraction and very prominent. The patient walked slowly with his hands pressed to the lumbar muscles. On account of the constant contraction of the muscles, palpation of the abdomen gave no aid to a diagnosis. Percussion of the abdomen was negative; of the thorax, showed what appeared to be an increase in the extent of the cardiac dullness. There was also palpitation. Slight dullness and decreased breath sounds were discovered over lower lobe of left lung. No bruit was heard through the thoracic wall. While in this hospital the patient always slept sitting in his bed, his head resting on his knees, and stated that in this position he obtained slight relief from his pain.

The symptoms found in the lumbar region and patient's general condition pointed to a diagnosis of Pott's disease, and the patient was put in a plaster jacket, which extended over the hips. The wearing of this jacket caused constant pain, and the patient made many appeals

to have it removed. After having worn it two weeks he stated it was absolutely unbearable, so it was removed. For ten days there was marked improvement in his general condition, which ceased on the appearance of symptoms similar to those accompanying the passage of a calculus through the right ureter, followed by anuria. It was then decided to place the patient under a general anæsthetic in order to make a thorough examination of his abdomen. A tumor was felt on the left of the median line, which appeared to be pressing on the posterior portion of the diaphragm. By placing a stethescope just above the umbilicus and making deep pressure a distinct bruit was heard and a diagnosis of aneurism made. Under the anæsthetic (ether) the heart became very eccentric and from it issued a peculiar snapping sound, easily heard 10 feet from the table.

After the patient's recovery from the anæsthetic, which was given about August 15, all his pain gradually increased and morphine was given continuously in doses large enough to bring relief.

On September 15, 1906, the patient died. The autopsy showed all abdominal organs normal, there being no signs of calculi. Death was due to rupture of an aortic aneurism into the right side of the thorax. The heart was only slightly enlarged and showed no signs of organic disease. The bodies of the seventh, eighth, and ninth dorsal vertebræ were eroded to a marked degree, though the intervertebral cartilages were intact. The aneurism affected that portion of the aorta lying just in front of the above-named vertebræ and was about 6 inches in diameter, the sac being partially filled with a semi-organized blood clot. The aortic walls were markedly thickened for 5 inches above and below the tumor.

CURRENT COMMENT.

SHOULD PROTECTED HOSPITALS BE BUILT IN SHIPS OF WAR?

By Medical Director J. C. Wise, U. S. Navy.

It is to be remembered that in the publication of these comments the Bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.

Doctor Wise, in submitting his own views in the comments which follow, says, "I do not know the exact opinion of our service."

It is gratifying to note what remarkable progress has been made on the humane side of war, especially in the past century; indeed, so much has been conceded that there are those who question if the amelioration of the horrors of war may not be carried so far as to lessen the dread of it, and thus lead the nations to enter into it the more readily.

To-day, a war ship contains, within a limited space, the greatest concentration of forces and activities of which we know; it is crowded with humanity, with stores, and with propulsion, lighting, ventilating, distilling, and refrigerating plants, and it is replete with instruments of destruction, being at the same time a monument to the genius and brutality of man. Every square inch of space, every ounce of weight, has been calculated with mathematical precision and allotted to its direct purpose—that is, as an agent of destruction, and as a successful accomplishment to this end we must acknowledge it.

Now the Medical Department steps on deck and insists on certain requirements, not well defined we must admit, in the interests of the sick and the wounded, and in the interests of all humanity. Have they asked too much? Have they gotten too little?

The services and uses of these expensive Government machines are of two kinds: Those in times of peace and those in time of war.

The writer had an opportunity not long since of making an inspection of two of our newest battle ships, lying at the navy-yard, New York. For cleanliness, the ships were immaculate—the lower decks were covered with linoleum, the air was fresh throughout. One of these ships had a complement of 550 men, and the sick quarters, not including a well-equipped surgery, a dispensary, and storeroom, represented accommodations for between 4 and 5 per cent of this incom-

plete complement. Out of the twenty-five beds there were not over four occupied, the remaining sick being cases allowed on the upper decks. It could also be said that under such conditions of service the sick and injured were most liberally dealt with; this in times of peace when a man of war is not doing what she is actually designed to do, viz, to fight.

Now, how is this situation affected by a declaration of war? The complement is filled up, the stores, including provisions, ammunition, coal, and other things, are rushed on board, and all is on a war footing; in other words, the machine is equipped for her intended purpose.

The Medical Department states that it requires a protected hospital—that is, one below the armor—and further stipulates that it shall be large enough to accommodate a reasonable expectation of wounded; that it shall be easy of access, distant from the firerooms or boilers, well lighted by electricity, and amply ventilated. Is the request reasonable?

In an article appearing in the April issue of the Journal of the Association of Military Surgeons, the writer expresses the opinion that the formulation of what can be done in caring for the injured in a naval conflict depends very largely upon whether the conditions to be considered apply to a ship or squadron which is victorious or to one which is vanquished. In the latter event, in the light of naval battles of to-day, such as we have seen in the last three wars, nothing is possible for the Medical Department—demoralization is complete; per contra in the event of victory, the wounded, as a rule, can be transferred and made comfortable.

M. Auffret (Service de Sante dans les Combats Navals) expresses the unanimous conclusion of the French "escadre du Nord" that this battle hospital "should be placed in the hold, beneath the armament, if it can be made habitable and assessible." If we can judge by a lack of expression, the Medical Department of the United States Navy is, for the present, content to let matters alone until it is more assured as to what is wanted. There is a tendency to use the sick bay (or peace hospital, if it might be so called) in time of battle, despite the fate of the wounded carried there in the Japanese-Chinese war, and on the *Reina Christiana*, at Manila.

Medical Inspector Ames, U. S. Navy, now serving in the North Atlantic Fleet, suggests that a portion of the hold might be fitted so that when required it could be readily converted into a battle hospital, the stores thus displaced being stored in the sick bay.

Doctor Randall, of the English service, expresses the view that the wounded should not be sent to the hold, where access is so difficult and the hygienic conditions so poor. Doctor Handyside, also of the English service, is equally opposed to the hold as a location.

A Spanish captain, Concas T. Palau, who served in the battle of Santiago, tells a sad story of the effort to carry the wounded into a protected hospital during that engagement. He declares that these posts were reached by such tortuous passages and were so obscure that they frightened the wounded, who preferred to submit to any risk rather than descend to them.

If the strongest argument adduced in favor of a protected hospital is that at least one medical officer and the stores are to be safeguarded, this can be easily answered by simply stationing the particular officer, with this material, at a reasonably protected point.

It seems evident that with a sense of all proper obligation to humanity, the sick and wounded on our ships of war are treated with full consideration—indeed, the avowed policy of the Bureau of Medicine and Surgery is to reduce the percentage of sick and wounded cared for in a ship of war, retaining only acute and emergent cases, transferring all others as quickly as possible to a hospital ship, which should accompany all fleets and disembarrass them of all invalids not likely to recover speedily.

If some space can be surrendered to our purposes, can it be made freely accessible and give those conditions for comfort which the Medical Department so insistently requires? We think, as a French writer has truly said in this regard, "protection is not primordial," nor can we of the Medical Department establish that the lives of the wounded are of more value than those who are physically intact.

Can we not secure a point for our sick bay or peace hospital, with a fair amount of protection, which will be available in time of battle? We believe in this direction lies the solution of the question; such was the disposition on the Russian ship *Cesarevitch*, built in France, and *Revitzan*, built at Philadelphia, in the United States. This principle has also been adopted in the English service, in some of their ships, and, according to M. Auffret, in France on the *Leon Gambetta*, *Marseillaise*, and *Montcalm*.

MEDICAL PROGRESS.

LABORATORY.

Surg. E. R. Stitt hereinafter has given us a complete, though brief, résumé of opsonic work up to date, and it is believed that the study of his notes will give a clear and working understanding of the whole subject. It is believed to be the first comprehensive contracted review of the theoretical foundation, the intent and possibilities of opsonins, and as such should, and no doubt will, be of extreme value to the medical officers of the service.

In connection with these notes and as a supplement thereto, we publish some interesting observations on vaccine treatment contributed by Asst. Surg. H. W. Smith, U. S. Navy.

NOTES ON OPSONINS AND THEIR PRESENT DIAGNOSTIC AND THERAPEUTIC STATUS.

By Surg. E. R. Stitt, U. S. Navy.

While other observers had previously noted the presence of substances in immune sera which so acted on the bacteria that phagocytosis was made possible, yet it was to Wright and Douglas, in 1903, that the existence of this factor in phagocytosis was brought forward and the estimation of such substances made practicable.

To this substance the name opsonin was given—the Greek word from which it is derived indicating preparation of the food—that is, the opsonin so alters or sensitizes the bacteria that they can be engulfed or phagocytized by the polymorphonuclear leucocytes (the microphages of Metchnikoff). About the same time Neufeld and Rimpau noted the presence of a substance in immune sera which so acted on bacteria as to prepare them for phagocytosis. Their designation "bacteriotropic substance" is practically synonymous with opsonin.

In 1902 Leishman introduced the method of determining the "phagocytic index." By taking one part of blood and one part of an emulsion of the bacteria in question and keeping the mixture in a moist chamber at body temperature for a standard time, as fifteen or

thirty minutes, and then spreading the blood-bacteria mixture and staining the film with Leishman or Wright's stain he counted the number of bacteria in a certain number of polymorphonuclears, and by dividing obtained the average number per leucocyte of bacteria phagocytized.

Thus a count of 100 leucocytes gave a total of 350 bacteria, an average of 3.5 bacteria per cell or a phagocytic average of 3.5. By comparing the blood of patients taken at different periods of the disease, or by comparing the blood of the healthy with the sick, a relation from the standpoint of phagocytosis could be obtained—a phagocytic index.

The Wright technique for determining the phagocytic average, and from this the opsonic index, is as follows:

Blood is taken from the patient and at the same time from a normal individual, or preferably the blood of several normal individuals is pooled. This blood is best collected in Wright's tube, although it may be received in a small test tube. After coagulation and separation of the serum, the serum is ready for use. The Wright's tube is similar to the ordinary bacteriological pipette, except that it has one end bent in U shape. This bent capillary end takes up the blood by capillarity, and by holding the bulb down, gravity, together with capillarity, makes it possible to quickly fill the bulb of the tube without suction. Another advantage is that the bend can be hung in the centrifuge tube like a shepherd's crook, facilitating separation of the serum by centrifugalization. Having the serum ready for the test the next step is to prepare the leucocyte emulsion. For this we fill a centrifuge tube with normal salt solution, to which has been added 1 per cent of sodium citrate—the latter to prevent coagulation. Then, having pricked a finger congested by a constricting rubber band, from 15 to 20 drops of blood are added to the citrated salt solution, and the mixture thoroughly shaken. After centrifugalization for about five minutes the red blood corpuscles will be thrown to the bottom of the tube with the leucocythes, forming a superimposed layer (Buffy coat). In order to free the leucocytes entirely from serum admixture, the supernatent citrated salt solution is pipetted off, and a fresh tubeful of salt solution is added to the blood cell sediment. Again shaking, we then centrifuge, obtaining for a second time a sediment of blood cells with the leucocytes in the superimposed layer. In some laboratories the washing in the salt solution is again repeated, but for all practical purposes the two washings as described above suffice.

The superimposed layer of white cells may now be pipetted off from the heavier red cells (of course containing a large admixture of red cells) to be used as a leucocyte cream—or by slanting the centrifuge tube we can pipette off the proportion of the leucocyte mixture as needed from the bottom, sides or top of the slanted layer of blood cells.

Experiments indicate a certain variation in phagocytosis whether the blood of the patient or some other person be taken, but for practical purposes the leucocytes are considered as an indifferent factor, so that it is immaterial where we obtain our blood for the leucocyte cream.

Having prepared our leucocyte emulsion, and the serum from the normal individual as well as that from the patient, it only remains to prepare our bacterial emulsion.

For bacteria in general, with the exception of the tubercle bacilli, we simply take up a small loopful of a young agar culture (eighteen hours or less), and emulsify it uniformly with salt solution, added by degrees until the suspension amounts to one-half to 1 c.c., and giving a faint turbidity. To thoroughly distribute and especially to break up clumps repeated suction and ejection with a capillary pipette provided with a rubber nipple is satisfactory.

In the case of tubercle bacilli, owing to their interwined growth, it is almost impossible to make them into a uniform emulsion. Furthermore, serum tends to clump live tubercle bacilli. To obviate this latter, we kill the tubercle bacilli by heat, i. e., 100° C. for fifteen minutes. As regards the former the difficulties are about insurmountable except with specially selected cultures. At the best, constant prolonged trituration in the mortar and repeated centrifugalization is necessary to secure even distribution of the bacilli. The presence of clumps in a bacterial emulsion invalidates the estimation of phagocytosis, for the reason that a leucocyte will take up a clump of twenty or more baccilli as readily as one separate organism.

Having at hand (1) the suspension of leucocytes, (2) the bacterial emulsion, and (3) the sera of the patient and the normal individual, we are ready to proceed with the test.

By taking about 6 inches of three sixteenth-inch glass tubing and heating the center in a flame, we are able to draw the heated central portion into a capillary tube of 15 or 20 inches. Filing at the center, we have two pipettes. The large end of the pipette is capped with a rubber nipple such as is used on a medicine dropper. A mark is then made with a wax pencil on the capillary tube about 1½ inches above its end. With manipulation of the pipette we draw up to the mark: First, the leucocyte cream. Then wiping off the tip of the pipette we draw this portion up about one-half inch from the end. Second, the bacillary emulsion, repeating the former procedure; third, the serum of the normal individual. This gives three columns in the capillary tube with intervening breaks of air. We next eject the three constituents into a watch glass and thoroughly mix them by alternate suction and ejection with the tube and nipple. When mixed we draw the mixture up into the same capillary tube, seal off the capillary end in the flame and put in an incubator for exactly 15 minutes.

We next repeat the process identically except that the patient's serum is used instead of that of the normal individual.

These two tubes having been kept at the same temperature for the same length of time are then taken out, the contents blown out into a watch glass, mixed thoroughly a second time, and then a smear is made—a drop of the mixture being deposited on a very clean slide and the smear made by a second narrower slide (by cutting off the corner of the slide) which is drawn along in a zigzag way. The smears are then stained (Leishman's or Wright's blood stain or Ziehl-Neilson's for tubercle bacilli) and the number of bacteria in from 50 to 100 leucocytes counted. This number divided by the number of cells gives the phagocytic average.

The phagocytic average of the patient's tube divided by that of the normal individual's tube gives the opsonic index.

Thus in counting 100 cells we find 500 phagocytized cocci in the patient's tube, giving an average of 5, and in the normal individual's blood we get 1,000, an average of 10. Then the opsonic index would be $5 \div 10$, or 0. 5.

While there are many factors, such as strength of emulsion, age of culture, deterioration of serum, etc., which cause variations, yet if the conditions attending the patient's tube and its control are identical, these factors should not disturb the result. It would appear that the errors in technique come chiefly from differences between the compared tubes in thoroughness of admixture, varying strength of leucocyte emulsion, and in making the smears, factors which can not be controlled as can length of time incubated and volume of ingredient used.

That the opsonin is contained in the serum is shown by the fact that if we mix the bacterial emulsion and leucocyte cream (which has been washed free of all adherent serum) no phagocytosis takes place. The fact that the opsonin in the serum acts on bacteria and not on the leucocytes is shown by the fact that if we treat the bacterial emulsion with serum, and then, after a contact of about twenty minutes, wash the bacteria free of this sensitizing serum, and then add these sensitized bacteria to the leucocyte cream, phagocytosis takes place, as in the regular technique with serum, bacteria, and leucocytes.

From the standpoint of therapeutics the opsonic index is of value to show the proper time for the administration of vaccines and as to whether the vaccine has been of benefit. Of course clinical signs of improvement or the reverse can in a measure take the place of the more delicate serum test, but it is recognized that the greatest benefit is derived where the stimulus of a vaccine injection is so slight that it is not manifested except by the influencing of the opsonic index.

Now as to preparing the vaccine.

It has been found satisfactory to make use of standard vaccines prepared from cultures kept in stock for staphylococcic, gonorrheal, and tuberculous affections. In case of other infections, however, and preferably with gonorrheal and staphylococcic infections, it is customary to isolate the causative organism from pus, sputum, urine, blood, or other material.

Having isolated the organism, it is inoculated upon one or more agar slants, and after a growth of from five to seven hours with streptococci and pneumococci, or with eighteen hours for staphylococci and colon, the growth on these inoculated slants is taken up with salt solution, thoroughly shaken up in the diluting solution, and standardized.

To standardize: We can dilute the bacterial mixture to say $\frac{1}{2000000}$, then plate out, and from this calculate the number of bacteria in one cubic centimeter. Thus, with a dilution of $\frac{1}{2000000}$, we count 100 colonies in a plate to which we have added one-tenth of a cubic centimeter. This would give $100 \times 10 \times 2{,}000{,}000$, or 2,000,000,000, bacteria to each cubic centimeter.

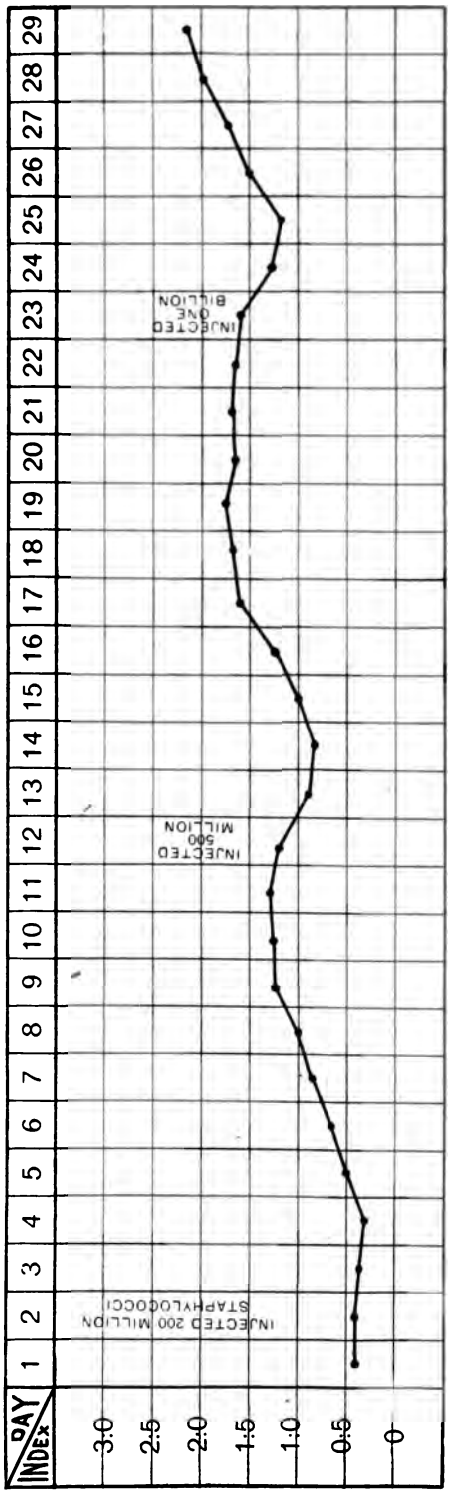
Wright found that by taking a definite quantity of blood and a similar quantity of bacterial emulsion, mixing the blood and bacterial emulsion, then making a smear and staining that, it was possible to determine the ratio of bacteria to red cells, and from this the number of bacteria per cubic centimeter could be determined. For example, if we find three bacteria to each red cell we should have 15,000,000 bacteria to 1 cubic millimeter (their being 5,000,000 red cells to the cubic millimeter). As 1 cubic centimeter is 1,000 times greater than 1 cubic millimeter, there would be 15,000,000,000 bacteria in each cubic centimeter of such an emulsion, or vaccine, as it is termed.

The standardization may be made with a haemacytometer, as by Leishman's method, but experiments in the Naval Medical School Laboratory have shown that Wright's smear method very closely approximates the results of the plating-out method.

The next step is to sterilize the vaccine. This is done by heating the bacterial suspension at 65° C. for one hour. We are then ready to inject our vaccine in appropriate doses. For staphylococci we inject 250,000,000 to 1,000,000,000. For streptococci it is well to commence with less than 1,000,000, and to consider 10,000,000 as a maximum dose. The same is true of pneumococci, although the dose may range from 10,000,000 to 50,000,000. For colon we give about 50,000,000, and of gonococci on an average 10,000,000. In injecting the vaccines every precaution as to asepsis should be observed.

To keep a record of the results of vaccine therapy it is necessary to have resource to an opsonic index chart, of which the following is a good example:

OPSONIC INDEX CHART.



Falling curve shows negative phase Rising curve shows positive phase.

After an injection of the vaccine the phagocytic defense is at first weakened, as shown by a lower opsonic index than prior to vaccination. This Wright terms his negative phase. After one or two days, in case the dose has not been too great, the phagocytic defense recovers itself, and the opsonic index rises to a point higher than that before treatment. This is the positive phase.

The secret is to obtain the greatest height of the positive phase with the least degree of negative phase. As a rule, successive vaccinations should not be made with shorter intervals than eight to twelve days, and the vaccine should be repeated before the negative phase sets in again. As a rule, the positive phase begins to decline about the seventh to tenth day.

Vaccination controlled by the determination of opsonic indices has proven of decided value in treating furunculosis and acne, also in gonorrheal arthritis and localized tuberculous affections. Successful results have been reported in colon affections of bladder and in post-operative cholecystitis cases. Good results have also been obtained in pneumococcic infections.

In the symposium on the opsonins in medicine at the recent meeting of the Association of American Physicians the trend of opinion was on the whole unfavorable. Baldwin, of Saranac Lake, considered that the technique was too imperfect to make the method a guide in giving tuberculin. Cole, of Johns Hopkins, was rather conservative, but referred to success with gonorrheal arthritis and bone, joint, and gland tuberculosis. Basset Smith, of England, in a recent number of the Journal of Hygiene, gives exhaustive reports as to results obtained in vaccination against Malta fever. He found that it was a practically useless procedure in the early, more acute stages of the disease; but when the disease was of a chronic type, as in the persistent keeping up of joint pains and neuralgias with delayed convalescence, that it has a distinct place in the therapy of the disease.

Vaccines would be of no value in typhoid, except possibly in some case when the patient had not the powers of resistance to establish convalescence.

Vaccination has been employed in endocarditis and in empyema with brilliant results.

THE VALUE OF THE OPSONIC INDEX IN DIAGNOSIS AND PROGNOSIS.

It has been thought that the presence of a persistently low opsonic index to the tubercle bacillus indicated tuberculosis. Again, the fact of marked fluctuations in the opsonic index, indicating autovaccination from some tubercular focus, would indicate tuberculosis. The normal individual should not give fluctuations in the index. It has been found that either in the disease or in artificially induced active immunity there are developed opsonic-like bodies which are more resistant to

heat than opsonins. Hence, if you heat the serum of a person to 60° for ten minutes, which normally destroys the opsonin, and upon testing still find opsonic power, the presence of the corresponding disease is indicated. This has been proposed as a diagnostic measure in incipient tuberculosis.

In treatment or diagnosis of tuberculosis Wright prefers Koch's T. R. or Neu Tuberculin in doses of from $\frac{1}{500}$ to $\frac{1}{100}$ of a milligram. Some prefer Koch's more recent "Bacilli emulsion."

Clark, of Chicago (Journal of A. M. A., Vol. XLVII, No. 26), has claimed the opsonic index to be of value in the early diagnosis of typhoid fever. In a study of thirty-three cases he found the opsonic index high. He found it necessary to heat the serum to 56° C. to destroy the lytic substances in the serum—the opsonin not being destroyed until about 60° C.

Houston and Rankin (Lancet, May 4, 1907) have reported as to the value of the opsonic index in diagnosing epidemic cerebro-spinal meningitis, the serum of patients with the disease causing marked phagocytosis, the index reaching four or five times the normal. They claim this to be of great value in differentiating tuberculous meningitis from that due to Weichselbaum's diplococcus.

Wright terms areas where the bacteria are developing, regions of low bacteriotropic pressure, so that the opsonic index of the fluids in contact with the focus or region of infection would be lower than that of the fluids of the general circulation.

This can be applied diagnostically, if the opsonic index of a pleural effusion or a cerebro-spinal fluid were lower to the tubercle bacillus than the serum from the blood it would indicate that the pleural or cerebro-spinal process was tuberculous.

OBSERVATIONS ON VACCINE TREATMENT IN SIR A. WRIGHT'S LABORATORY, ST. MARY'S HOSPITAL, PADDINGTON, LONDON.

By Asst. Surg. H. W. SMITH, U. S. Navy.

This abstract is a general sketch of the work in opsonic treatment as seen during a visit to Sir A. Wright's laboratory. The technique is fully described in the article by Surgeon Stitt and will not be mentioned.

The principle of the vaccine treatment is that by inoculation of dead cultures of a bacterium an augmented supply of antibodies will be provoked, which will prevent or cure the disease caused by that organism. These bodies, called opsonins, do not stimulate the leucocytes, but unite with the bacteria and prepare them for phagocytosis. Opsonins are distinct from bacteriolysins, agglutinins, and antitoxins, and they possess a high degree of specificity. The leucocyte is an

indifferent or constant factor, and the degree of phagocytosis indicates the relative quantity of opsonins present in the blood serum, which thus furnishes the variable factor.

All bacterial diseases are treated. There is no rule as to the number of organisms to be injected; the amount of bacterial suspension containing one million organisms is arbitrarily taken as one unit. A quarter of one unit is considered a small dose, but individuals vary greatly in susceptibility, and with different organisms different amounts are required. The danger of overdosing lies not only in the amount of toxin administered but also in the amount of toxic material caused to be set free by the injection, and which is not previously determinable.

Phases.—Immediately after an injection the opsonic powers of the serum are diminished; this constituting the negative phase and is demonstrated by taking the index. After a variable interval the opsonic powers return in greater force than before—the positive phase. In a general way the occurrence and duration of the positive phase may be regarded as a prognostic sign.

Guides to treatment.—The amount of dosage and the frequency of administration must at present be ordered according to the index. A low index requires careful consideration of all symptoms. It may be due to slight absorption, which results in inadequate stimulation and consequently no reaction, or to prolonged excessive absorption, and hence a continued negative phase which may be analogous to the low white counts in the rapidly fatal cases of pneumonia and general peritonitis. In the case of a low index it is advisable to begin with a small dose and be guided by the developing indications.

An injection during a negative phase results in further depression of the index, and an injection during a positive phase renews the negative phase before the benefits of the previous injection are apparent; the administration is most productive of results if made at the height of the tide—on the plateau of the curve—just before the ebb.

The signs of cure are the usual clinical symptoms and the state of the index. The two final tests of the extinction of the focus are:

(*a*) Bier's congestion. Bier's apparatus is applied for thirty minutes to one hour. In about one hour there is a marked drop in the index if the focus is still active.

(*b*) If congestion does not affect the index, the part is energetically massaged. If both tests yield negative results and there is no change in the index, it is inferred that the focus is extinct and that no more absorption from it is possible.

At St. Peter's Hospital for Genito-Urinary Diseases all infections that resist ordinary treatment are subjected to opsonic methods. The most common cases are of chronic gonorrhea and its numerous complications, the very chronic cases of cystitis due to B. coli, post-operative infections, and genito-urinary tuberculosis. The reactions

obtained were described to me as "extraordinary," but as yet the cases have been too few to permit of final judgment.

Cases are received from various clinics at Wright's laboratory and there treated. Charts are kept of each case, showing daily index, times of injection, amount of dosage, and clinical notes. Among the cases shown as being markedly benefited were chronic empyema; unresolved pneumonia; various forms of tuberculosis, mostly surgical; gonorrhea and its complications; endocarditis; acne and furunculosis; and cystitis.

In recent English work on the bacteriology of peritonitis it has been noted that a primary infection with the Staphylococcus albus was protective against a subsequent superimposed infection with a virulent Streptococcus. It may be that the development of the observations in connection with opsonins will lead to a notable advance along these lines, although the specificity of opsonins is generally believed to be of high degree.

It has long been known that a tight band proximally situated enhances the ravages of an infective process. The paradoxical success of Bier's treatment has been explained in many ways, but the true explanation of the apparent discrepancy is probably indicated by Wright's work.

To repeat, an injection of a certain number of the infecting organism is followed by an immediate fall in the opsonic index, with presumably a correlated fall in the antitoxic or antibactericidal powers of the serum. Repeated injections during the negative phase successively depress the index and a dangerously low state of resistance is induced. If, however, time sufficient for the positive phase to set in be allowed to intervene between doses, the succeeding injections raise the index to a point higher than before.

If a constricting band be allowed to remain above a septic lesion twenty minutes to one hour, a negative phase appears, precisely as after an injection, and in favorable cases the ensuing positive phase comes on as regularly. It is probable that the intermittent application of the Bier bandage acts by increasing absorbtion, and thus there is automatically administered a dose of toxin—the amount of which is regulated by the duration of the congestion—comparable to Wright's more accurately measured dosage with counted bacteria. It seems further that the evil effects of prolonged congestion are due to a continued excessive absorption of the toxin, no time being given for the reaction, with the consequent progressive increase of the negative phase until resistance becomes almost nil.

If this is so, and both methods have an identical rationale, a choice is left the practical surgeon, who can make his selection with regard to the individual case and according to available facilities—a very real consideration. Bier's method insures working with the specific bac-

terium at fault and dispenses with elaborate technique. Wright's method is scientifically more satisfactory, is more accurate in dosage, its results may be observed and graphically charted, and it is practicable in situations where congestion can not be applied.

THE DIAZO REACTION IN TUBERCULOSIS.

The prognostic value of the diazo reaction in tuberculosis is again pointed out in the Medical Record of March 23, 1907. In that publication John Roy Williams reviews the observations of Michaelis, Karl von Ruck, Wood, and Upson, and presents his own conclusions from observations in a series of one hundred cases. Opinions coincide that the value of this reaction as a prognostic sign in tuberculosis is no longer a disputed question, that is, in the white race, and that it is generally accepted as a fact that the persistent presence of a marked diazo reaction in tuberculosis means an unfavorable progress and termination of the case. While the absence of the diazo reaction in the white race is of a favorable prognosis, the apparent absence of the reaction in all tuberculous blacks, whatever the explanation, is so curious a circumstance in view of its presence in typhoid infection that it is a matter entitled to further and careful investigation.

The conclusions which Williams deduces from his observations are:

(1) That for accuracy, should the fresh specimen fail to give the diazo reaction, we should allow the urine to stand for twenty-four hours and examine again.

(2) Having made the test, the foam failing to show the reaction, the mixture should be allowed to stand for twenty-four hours to see if there is or is not formed a greenish precipitate.

(3) That the absence of a diazo reaction in white tuberculous cases is of a favorable prognosis as a rule.

(4) That the presence of a diazo reaction in white tubercular cases is of an unfavorable prognostic value.

(5) That the absence of the diazo reaction in the tuberculous negro is of no prognostic valve.

(6) That there is possibly a racial difference between the whites and blacks which accounts for the absence of the diazo reaction in the urine of the tuberculous negro and the presence of the diazo reaction in the urine of the white tuberculous in the advanced stage.

SURGERY.

By Surg. H. C. CURL, U. S. Navy.

GUNSHOT WOUNDS OF THE STOMACH.

Dr. Walter Martin, in the Annals of Surgery for May, 1907, discusses gunshot wounds of the stomach as seen in civil life.

While some of his deductions must be modified for use in military surgery, they are, in the main, very instructive. The unusual occur-

rence of gunshot wounds of the stomach, without those of other important abdominal viscera at the same time, is noted, and it is urged that fatal results should not be charged to the stomach lesion alone. The author indicates the more serious nature of an overlooked perforation and leak in the anterior wall of the stomach than one in the posterior wall, although (in this) a subphrenic abscess may form and delay convalescence.

If the perforation (in the posterior wall) can not be found by examination through a reasonable tear made in the gastro colic omentum, he recommends that a purse-string suture be placed around the wound (in the anterior wall), a tube (catheter) introduced, and the stomach dilated by sterile water while the lesser omental cavity is watched for fluid forced from the stomach. The very probable infection of this space (by the stomach contents) he considers as a lesser evil than failure to find the wound in the posterior wall.

The diaphragm is one of the organs most frequently involved as a complication of stomach injury and often proves troublesome to manage.

Involvement of spleen, pancreas, pericardium, kidney, large and small intestines are cited, and in no case should anything less than a thorough examination be made. Delay for verification (of diagnosis) by vomiting of blood is to be condemned, and immediate operation he considers as always indicated.

The method of demonstrating a posterior gastric leak is defended from data and is considered as more desirable on general surgical grounds.

Many of Doctor Martin's recommendations could be carried out at sea, for on board a ship (especially a victorious one) the surgeon is, as regards operating-room facilities, much better off than the army surgeon is after an engagement on land, although the best-equipped man-of-war operating room is not as satisfactory as one in a hospital

GASTRIC ULCER.

Dr. William J. Mayo, in the June, 1907, Annals of Surgery, calls attention to the need for careful separation of the cases of indurated and nonindurated types of gastric ulcer, especially in regard to surgical interference. His statistics show that indurated duodenal ulcers are fully as common as indurated gastric ulcers; that the terminal three-fourths of an inch of the pyloric end of the stomach, the "canal of Jonnesco," does not take part in the grinding function of the antrum and is an uncommon site for ulcer. He says the duodenal ulcer does approach the pylorus, but that its being distinctly duodenal can be determined by the quite constant presence of two veins which extend from the inferior margin of the pylorus, on the gastric side, upward

and across about three-fourths of its extent. A similar vein approaches this from above, often anastomosing with it.

Doctor Mayo considers that more than 50 per cent of cases of gastric cancer have their origin in ulcer and indicates their coincident topography. Cancer of the duodenum is rare.

As to the existence of chronic, nonindurated mucous ulcer, he seems doubtful; that its symptomatology is at best vague; that "pyloric spasm," considered by many as important, is the most "mysterious" symptom of all.

Attention is called to the formation from the primitive fore gut of the posterior wall of the pharynx, the esophagus, stomach, and duodenum to below the entrance of the "common duct;" in other words, that part of the digestive tract which prepares food for digestion. The "absorption" portion is from the mid gut. His experience inclines him to go further than Kölling, and he considers that not only is the control of the pylorus vested in the duodenum, but also in all of the mid-gut derivatives. Pyloric spasm, then, is an "indication of an irritation in some part of the intestinal canal which causes an irregular attempt to close the pylorus and thus prevents food from entering the disturbed area." As having a bearing on this, operations for conditions considered as being chronic nonindurated mucous ulcers have, as a class, been very unsatisfactory. It can readily be seen that a gastro-enterostomy makes impossible any such reflex control of the passage of food from the stomach and therefore would do harm.

The author sums up by saying: "At the present time we do not consider that a diagnosis of mucous or other undemonstrated ulcer indicates a surgical operation, without there exists complications such as perforation, hemorrhage, or obstruction."

VISCERAL RUPTURE.

In an interesting and valuable article published in the Journal of the American Medical Association of March 23, 1907, Emanuel J. Senn discusses the "Etiology and Pathology of Traumatic Rupture of the Abdominal Viscera." He points out the importance of these accidents as regards the life of the patient, and reminds us of the need of early diagnosis, quick decision, and aggressive, courageous surgery, to the end that prognosis may become more hopeful.

The spleen, pancreas, liver, stomach and intestines, kidneys and bladder are taken up seriatim and considered fully in point of the comparative frequency of rupture, anatomical features and predisposition, character of the injury, mechanism of the injury, symptoms and pathology, etc., and it is brought out clearly and rationally that the etiology has an important bearing in making at least a probable diagnosis. Either hemorrhage, shock, or peritonitis is apt to follow, as a

natural course, rupture of any of the abdominal organs, and in this grave pathological condition only speedy surgical intervention will save the patient's life. The possibility of such an accident is an ever present and imminent possibility in the Navy, and we can not be too thoroughly prepared to meet the requirements of these cases.

TYPHOID PERFORATION AND BLOOD PRESSURE.

In the Lancet of May 11, 1907, Sheppard presents a paper discussing "Perforation in Typhoid Fever and its relation to the Blood Pressure." According to his observations a rise of blood pressure immediately follows the catastrophe of perforation, and though not infallible or as certain as some figures would indicate, it is nevertheless a most valuable corroborative sign to be counted among others already well known. The fact that the signs of perforation are notoriously uncer tain should make us eager to welcome any addition to the symptom atology of this accident which promises to facilitate a diagnosis and open the way to necessary prompt measures for relief. As so few records have been published, Janeway points out that the value of the blood pressure chart both as positive and negative evidence of perforation may be established only by an accumulation of data, and he urges further observation and full report on all cases.

Up to the present time five cases have been reported by Crile (J. A. M. A.), who found that the blood pressure rose in every case immediately after perforation, as his figures show.

No. 1. Blood pressure rose from 116 to 190 in four hours.

No. 2. Blood pressure rose from 84 to 110 promptly.

No. 3. Blood pressure rose from 116 to 165 in two hours.

No. 4. Blood pressure was 165. Previously unknown.

No. 5. Blood pressure was 208. Previously unknown.

The same observer found the average blood pressure in 115 cases of enteric fever to be 104, varying between 138 and 74, the pressure as a rule gradually decreasing till the fourth or fifth week, when the average was 96 and 98.

In 41 cases where I made observations during or about the fourth week, the average blood pressure was 98. Briggs (Bost. M. and S. J.) also records a case in which the blood pressure rose from 106 to 144 in four hours, and four hours later the patient suddenly developed typical signs of perforation. This anticipation he explains by suggesting that the resultant inflammation did not reach the parietal peritoneum for eight hours after the accident.

Sheppard goes on to say:

In no case of typhoid fever with fairly sudden abdominal pain combined with any one well-recognized sign (providing there is no other ascertainable cause), should we hesitate to diagnose a perforation. Amongst these signs should certainly be placed a rise of blood pressure. It seems quite as constant as leucocytosis, and is certainly more easy to observe and chart throughout the course of the disease. A disadvantage that may arise, as I found, is that owing to restlessness it may be impossible to make an accurate estimation. It will not be common to meet with cases, where violent hemorrhage occurring with perforation renders the pulse

imperceptible. In any such case, however, the seriousness of the condition is obvious and the loss of the knowledge of the blood pressure immaterial. All my estimates were taken with Martin's modification of a Riva-Rocci sphygmomanometer.

In the diagnosis of perforation we must remember that the signs are nearly always most marked about two hours after the accident has occurred, after which they are usually found to return to their previous conditions and consequently impressions likely to be made on those who see the case at a later stage are often liable to be misleading. The change in blood pressure is no exception to this rule as the tendency seems for it to fall again to its original level as rapidly as it has risen.

With the exception of one case with severe bronchitis in an old woman in whom the pressure rose from 114 to 130, the negative evidence in the above cases and in others I have investigated has gone to prove that there is no sudden rise of blood pressure in any of the other complications—in which this sign probably stands by itself—as distension, slight pain, leucocytosis, and a rise of pulse may each occur in other circumstances. Summing up, therefore, we may generally regard a rise of blood pressure as positive evidence of perforation, although a stationary pressure is no indication that the catastrophe has not occurred.

TROPICAL MEDICINE.

NEURASTHENIA.

Discussing Tropical Neurasthenia in the American Journal of the Medical Sciences for April, 1907, Louis H. Fales devotes considerable space to the interesting question of etiology, and very naturally, as this seems to be the only considerable reason for a differentiation of nerve exhaustion. In other words, there are not clear cut types of neurasthenia, but there are various causes for the condition, and this fact has given rise to the designation of tropical neurasthenia. It is a veritable neurasthenia, as Woodruff and King, and now Fales, point out, and the symptoms, among which insomnia and loss of memory are prominent, are everywhere being brought to our notice. It behooves the Government surgeon who ever expects to do service in the Tropics to prepare himself for its early recognition and to understand its etiology with a view to the exercise of an intelligent prophylaxis. Not only is this general exhaustion per se, which is so common in our insular possessions, a problem of economic importance to the public service, but the possibility of more active invalidism to which it exposes one may give it the importance of beginning disaster. It saps natural immunity and reduces man's resistance to every disease.

Briefly stated, the writers on the subject argue to show that the tropical development of nerve exhaustion is caused by the actinic or short waves of light, which are of great intensity in the Tropics, acting in conjunction with other influences, such as manner of living; the effect of certain infectious diseases, like dengue and dysentery; the effect of the excessive use of alcohol, and the effect of continuous and

excessive moist heat. Fales discusses these etiologic factors at length and in a very interesting and enlightening manner, but lays particular stress upon the effects of tropical light, in accord with Woodruff's opinion, which is based on Von Schmädel's theory concerning the purpose of skin pigmentation. The underlying mechanism in the production of tropical neurasthenia has been very prettily reasoned to depend upon some derangement in the vaso-motor system—a neurosis involving a sequence of dynamic, chemical, and physiological actions aggregating to determine an imbalance of metabolism, exhausting the functions peripherally, and, through a compensatory anæmia, inhibiting the function internally and centrally; and also upon the relaxation due to excessive heat and a moist climate, involving the skin's function in regulating bodily heat through reflex action.

The character of prophylaxis may be inferred from the recitation of the causes, and as regards treatment early change of climate is usually all that is necessary.

HYGIENE.

By Surg. W. H. Bell, U. S. Navy.

TYPHOID FEVER.

In the Boston Medical and Surgical Journal of May 9, 1907, Harrington discusses typhoid bacilli in regard to propagation and mode of conveyance in the production of epidemics.

He points out and comments briefly upon the better known mediums of infection, such as water, organic filth, milk, and mollusks (oysters and clams), but dwells at length, in the citation of specific instances, upon the important rôle played by contact in the spread of the disease. Indeed, "Contact infection" has been given far too little consideration in our attempts to account for the presence of typhoid and in the formulation of prophylactic measures, and while, of course, the term is applicable to the personal infection of articles of food and drink, it is also intended to convey the idea of direct man to man infection. The now unquestioned persistence of the typhoid bacillus in the excreta of those even long convalescent from typhoid must put us on guard, and this fact, coupled with the numberless examples of typhoid transmission through the agency of fomites and attendants, must inspire an increased vigil in the management of the disease.

THE EPIDEMIOLOGY OF MALTA FEVER.

Malta fever has been for years such a large factor in the invalidism of the English army and navy that it is little wonder the sanitarians of these two services have worked so assiduously to run the disease to

earth. All have been cooperating in the accumulation of data to this end, but to Col. David Bruce, R. A. M. C., belongs the preponderance of credit for the gratifying results of the investigation, and his name has been prominent as a student of the disease for many years. In summarizing the conclusions of the commission sent out to Malta by the Royal Society to investigate and, if possible, to find out the cause of Malta fever, Colonel Bruce passes in review all the chief peculiarities of the disease—its geographical distribution, how it has disappeared from Gibraltar, and how it is found in South Africa, China, India, the Philippine Islands, and America; its prevalence in Malta all the year round, though markedly increasing in summer; the greater liability of the better social classes to the disease; and the characteristics of its temperature curve and the rheumatic and neuralgic features.

As regards the history of the specific organism, it was determined, first, that the Micrococcus Melitensis leaves the body by the urine; second, that outside of the body it is fairly resistant to external influences, except to direct sunlight, which kills it in a few hours; and, third, that it again gains entrance to healthy animals by way of the alimentary canal, a single drink of fluid containing but few micrococci almost certainly giving rise to the disease. It is believed on good ground that direct contact is not concerned in the conveyance of the disease nor is there any evidence that inhalation of infected dust or mosquitoes play any part. The maltese goat is particularly implicated, having been discovered to act as the reservoir of the virus and to be the principal factor in the spread of the disease. Fifty per cent of these animals in Malta responded to the agglutination test and actually 10 per cent were found to be secreting the micrococcus in their milk, and the opinion that the infection is propagated by this goat is given clinching support in the fact that the disappearance of the fever from Gibraltar was coincident with the disappearance of the maltese goat from the rock.

Preventive measures in accordance with this discovery were begun in Malta in June, 1906, and the remarkable diminution of the fever, which has followed, justify the belief "that Malta now has a chance of being converted from one of the unhealthiest stations of the British navy to one of the most salubrious."

LEPROSY IN JAPAN.

Through recent advices we learn that the Japanese Government is again exhibiting that modernity, energy, and alertness which has so marked its management of plague by the promulgation of laws relative to the prevention of leprosy and its treatment. The provisions of the law are in accord with the civil codes of Japan, and financially

dependent upon ordinances peculiar to that country, an unfamiliarity with which leaves us in ignorance as to the exact means of defraying expenses.

However, the hygienic aspect of the law which most concerns us is clear, and we trust will be as effective as it is definite. It provides for the reporting of all cases within three days of their diagnosis and the removal of a patient or the examination of a leper's dead body. It makes specific rules or regulations for the disinfection of houses containing a leper or infected with leprosy; the isolation and treatment of lepers, designating the guardians legally responsible for their support; the circumstances under which the leper may become a public charge, when the city, village, or division is to grant temporary aid and protection to a leper and his companion, or to any person living with him in the same house; and the disposal of the dead body and the personal belongings of the deceased. It also provides for the establishment of asylums (private and public).

According to the law, a physician who has failed to present the required report or who has violated the provisions in regard to disinfection shall be punished by a fine.

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NO. 3 VOL. 1

UNITED STATES NAVAL
MEDICAL BULLETIN

FOR THE

INFORMATION OF THE MEDICAL DEPARTMENT OF THE SERVICE

LIMITED TO PROFESSIONAL MATTERS AS OBSERVED BY MEDICAL OFFICERS AT STATIONS AND ON BOARD SHIPS IN EVERY PART OF THE WORLD, AND PERTAINING TO THE PHYSICAL WELFARE OF THE NAVAL PERSONNEL

OCTOBER, 1907

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This United States Naval Medical Bulletin is published by direction of the Department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

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PREFACE.

The publication and issue of a quarterly bulletin by the Bureau of Medicine and Surgery contemplates the timely distribution of such information as is deemed of value to the medical officers and the hospital corps in the performance of their duties, and with the ultimate object that both shall continue to advance in proficiency in respect to all of their responsibilities.

It is proposed that the Naval Medical Bulletin shall embody matters relating to hygiene, tropical and preventive medicine, pathology, laboratory suggestions, advanced therapeutics, surgery, medical department organization for battle, new methods of treatment, and all other matters of more or less professional interest and importance under the conditions peculiar to the service and pertaining to the physical welfare of the naval personnel.

It is believed that the corps as a whole should profit, to the good of the service, out of the experience and observations of the individual. There are many excellent special reports and notes beyond the scope of my annual report being sent in from stations and ships, and by communicating the information they contain (either in their entirety or in part, as extracts) throughout the service not only will they be employed to some purposes as merited, but all medical officers will thus be brought into closer professional intercourse and be offered a means to keep abreast of the times.

Special attention will be given by the instructors of the Naval Medical School to the review of advances in medical science of special professional interest to the service, as published in foreign and home journals, and extracts from these will appear in the bulletin, together with such remarks as the instructors may deem of value to officers on foreign service or sea duty.

Information received from all sources will be used, and the Bureau extends an invitation to medical officers to prepare and forward, with a view to publication, matter on subjects relating to the profession in any of its allied branches.

P. M. Rixey,
Surgeon-General U. S. Navy.

SPECIAL ARTICLES.

THE SO-CALLED FUNCTIONAL OR ACCIDENTAL HEART MURMURS, WITH SPECIAL REFERENCE TO THEIR ETIOLOGY AND CLASSIFICATION.

By Passed Asst. Surg. P. E. McDonnold, U. S. Navy.

Among the many lessons taught by experience in the practice of medicine, none, I think, is of more importance to the physician than a proper appreciation of the various abnormal sounds heard over the præcordia. As a rule, the student graduating in medicine leaves college with a very hazy idea of any heart murmurs other than the classical organic murmurs and the equally classical "anæmic" murmur of the pulmonary area. All murmurs occurring outside of the pulmonary area he is apt to regard as indicative of organic valvular disease, and the fact that a heart murmur per se is of little or no diagnostic value in the determination of this condition is a lesson that usually is learned only as a result of much puzzling experience.

My attention was first called to the great frequency of the so-called functional murmurs several years ago while serving as a member of a medical examining board for the examination of candidates for entrance to the Naval Academy, when about 350 young men, ranging in age from 16 to 20 years, came up for physical examination. These examinations were held immediately after the mental examinations had been passed, and as a result the candidates appeared before the examining board in a state of more or less mental and physical exhaustion. They had not only been spending long hours in study, with consequent loss of sleep, and possibly the overuse of tobacco, but had been attempting at the same time to bring themselves up to the required physical standard by athletic exercises of various sorts. The excitement attendant upon the examination acted as an additional factor in the production of such a large number of functional heart murmurs that the members of the examining board came finally to expect a murmur rather than the contrary in every candidate who presented himself. The greater portion of these murmurs were systolic, with maximum intensity in the pulmonary area, but a number had their maximum intensity in the mitral or aortic areas, and they were accompanied at times by physical signs which made their differentiation from organic murmurs exceedingly difficult.

[illegible] interested in the [illegible] and I have taken this [illegible] the subject, hoping [illegible] general interest. I have [illegible] according to their origin, cer- [illegible] appear to be sufficiently well recognized to permit of [illegible] proceeding.

FREQUENCY.

The frequency of the occurrence of these murmurs is somewhat surprising when it is first brought to the attention. Statistics upon the subject are somewhat meager, but I have been able to find enough to give a fair estimate as to their occurrence in routine examinations. Kingsbury has given the most convincing proof in the Report of the Presbyterian Hospital, New York, 1900, in which he publishes the results of 720 post mortem examinations of the heart. Of these, 240 cases had a history of a murmur during life, but in only 138 could any valvular lesion be found. In other words, over 42 per cent of the cases associated with murmurs, or over 14 per cent of the total number of cases examined, had a murmur without any valvular lesion to account for it. Thirty two of the murmurs were basic, 28 being systolic and 3 diastolic; 34 were apical, of which 31 were systolic and 3 diastolic; 28 had murmurs at both apex and base, and there were 8 musical murmurs.

Conkling reports that 36 per cent of all apical systolic murmurs found by him in his examinations at St. Peter's Hospital, Brooklyn, at the Brooklyn City Dispensary, and in his private practice during a period of three years were unassociated with inflammatory valvular disease. Dickinson, in the discussion of Conkling's paper, reports that in the examination of 1,400 candidates for firemen under the New York [illegible] were found with heart murmurs, [illegible]

[illegible] (cardiopulmonary) in [illegible] 13 per [illegible] of 77 [illegible]

[illegible] be found [illegible] examinations [illegible]

[illegible] present in [illegible] sur- [illegible] hospital [illegible] ages in [illegible]

Putnam reports 30 accidental murmurs (cardio-pulmonary) found in 400 examinations (7½ per cent).

A general average of the above reported cases, omitting the statistics of Conkling, which represent only the relation existing between the organic and functional murmurs in point of frequency, gives 32 per cent. This means that in every 100 consecutive examinations we may expect to find 32 functional murmurs.

EXPERIMENTS AND THEORIES AS TO THE MODE OF ORIGIN.

In regard to the mode of origin of these murmurs, the theories which have been advanced have been legion. From the time of Laennec the solution of this problem has been diligently sought by many investigators, but there has been a great lack of uniformity in the conclusions which have been reached. This lack of uniformity has been due to some extent, I think, to the fact that many of these investigators have attempted to account for all such murmurs by one or two mechanical causes, apparently overlooking the possibility of there being a variety both of causes and murmurs. I shall mention briefly the more important experiments and theories upon which our knowledge of the origin of these murmurs is based:

Corrigan, of Dublin, in 1829, objecting to the theory advanced by Laennec that the murmurs were sounds produced by the contraction of the heart muscle, began an investigation of the subject, as a result of which he concluded that some obstruction in the blood channel was the most frequent cause of heart murmurs. He held that the movement of the blood in the arteries in health was unlike that of an ordinary current as it was propelled en masse, while in the ordinary current the different particles of the stream moved at different rates, those at the center moving with the greatest rapidity, the velocity varying as the particles receded from the center or struck an obstacle. Thus a compound motion was produced. This was prevented in the arteries in health by their being always full and equally distended and the action of the heart regular. When, however, anything interfered with the regular action of the heart or the equal distention of the arteries, this compound motion was produced, causing a murmur. He proved that a murmur might originate in this way by experiments and also that the sound became audible, not at the seat of the obstruction or constriction, but over the dilated part beyond.

In 1832 Felix Savart published the results of his experiments on the production of sounds by liquid veins, and in 1858 Chauveau applied these discoveries to the production of heart murmurs. Chauveau experimented on horses and came to practically the same conclusion as that reached by Corrigan, viz, that the murmur was generated beyond the point of constriction and was carried forward

such an occurrence, the left appendix being deeply buried behind the root of the pulmonary artery and adjoining ventricle when any degree of dilatation takes place. In all of the autopsies which he reported there was more or less dilatation and in every case the left ventricle was either invisible from the front or could be seen in profile view only when the left wall of the pericardium had been drawn outward. The conus arteriosus of the right auricle and the pulmonary artery, in varying proportions, occupied the pulmonary area in every case, and he thought the pulmonary murmur due to pressure on the pulmonary artery by the dilated left auricular appendix.

After such evidence Balfour's theory seems more than doubtful, and Russell's theory is called in question by Ball, who states that in no case of anæmia or debility is there sufficient tension in the left auricular appendix to cause pressure on the pulmonary artery to such an extent as to produce a murmur. Foxwell also denies the possibility of Russell's theory, and was unable to produce a murmur experimentally in this manner.

According to Ball, the pulmonary systolic murmur is due to more or less dilatation of the pulmonary artery, combined with increased rapidity in the flow of the blood current, and this opinion has been confirmed by Foxwell, who, in 1899, published the results of a large number of experiments made by him during the course of several years with a view to determining the cause of this murmur. This paper shows a thorough study of the subject, and is one of the most important contributions to the literature of functional heart murmurs in many years. The murmur described by Foxwell is associated with an upward and outward displacement of the apex beat, an increase upward in the percussion dullness, pulsation in the second, third, and fourth intercostal spaces, accentuation of the second pulmonic sound, and a thrilly and rapid pulse. He states that post-mortem examination shows not only the condition of the heart as indicated by these physical signs, but an enlargement upward of the conus arteriosus of the right ventricle, which bulges unduly forward and is wider than normal. The pulmonary artery is similarly widened and bulged forward by dilatation and this, he says, is the explanation of the upward increase in the percussion dullness. The stretching of the conus carries the pulmonary valves upward, and in 20 post-mortems on cases of exhausting diseases, reported by various observers and collected by him, they were found on the average under the second left cartilage. He reports 6 additional autopsies in which the same condition was found, and, as further evidence on this point, Bramwell quotes Gibson as reporting 45 post-mortems, in 44 of which the pulmonary artery, either in whole or in part, bore to the left of the sternum and presented itself behind the upper costal cartilages and spaces from the first to the third space.

Foxwell explains the change in the apex beat by saying that the dilated conus pushes the right ventricle down upon the unyielding diaphragm, the apex in consequence being pushed upward and outward. He believes the murmur due to a dilatation of the conus and pulmonary artery, and in order to demonstrate the possibility of the sound being produced in this way he constructed an apparatus by means of which he was able to force fluids through the heart after its removal from the body and obtain at the same time an action similar to that of the valves of the heart. By cutting a window in the pericardium he was able to produce at will an artificial dilatation of the conus and pulmonary artery, and when a fluid was then forced through the heart a murmur was obtained in almost every instance in the 18 experiments he thus performed. He admits that experiments of this kind can not always be depended upon to give the same results as would be produced in the living heart, and says that due allowance must be made for this fact in the consideration of the conclusions which have been drawn. As these conclusions, however, are practically the same as those drawn by other observers from different experiments, there seems to be no reason to mistrust their evidence.

As stated elsewhere, Foxwell found that a murmur could not be produced by the pressure of the left auricle upon the pulmonary artery so long, at least, as the pericardium remained intact, as the pressure was insufficient. He found, however, that a relatively small amount of pressure upon this artery, especially if it were dilated, produced a murmur, while a murmur could only be produced with difficulty by pressure on the aorta. The dilatation of the pulmonary artery and conus comes about in life, he thinks, owing to a sudden strain being put upon a debilitated right heart. He denies that the pulmonary murmur is due to any change in the quality of the blood, and in proof of this reports 10 cases in which a microscopical examination of the blood showed anæmia, sometimes marked, but in which no murmur was present, and 13 cases in which the murmur was present but no change could be found in the quality of the blood. In this connection he also reports experiments on two dead subjects in which various fluids were forced through the heart in situ. The most important change noted in the character of the sounds, when the pressure remained constant, occurred in one instance when thick starch water was forced through the heart and a murmur which had been present was much diminished in intensity. Foxwell declined to accept, however, the natural conclusion that would be drawn from this experiment, viz, that a relatively thin fluid would tend to increase the intensity of a murmur though it would not of itself produce it.

The most recent experimental work that has been done looking to the discovery of the cause of functional murmurs is that reported by Thayer and McCallum, of Baltimore. As a result of their experiments on dogs they found that a pulmonary systolic murmur could be produced with the greatest ease by pressure on the conus arteriosus of the right ventricle or the pulmonary artery. They also succeeded in obtaining this murmur after hemorrhage; as a result of lowered arterial tension; when a saline solution was injected; and, in a general way, conditions which caused "an abrupt action of the right ventricle with a large excursion of the pulse wave in the pulmonary artery" favored the development of murmurs at this point. Murmurs could be similarly produced in the aortic area, but with much more difficulty.

Prior to the experiments of Thayer and McCallum, Thalma had attempted, unsuccessfully, to obtain the pulmonary systolic murmur by the partial exsanguination of dogs, and his failure to do so had been considered an argument against the "hæmic" origin of the murmur. The murmur, when resulting from hemorrhage, is presumably due to a lowering of the arterial tension and a consequent lessening of the resistance to the flow of blood in the pulmonary artery and aorta, which produces practically the same condition as would prevail when a fluid is forced through a cylinder into a cavity, which we know is productive of murmurs. The injection of a saline solution intravenously increases the blood pressure in the right heart and pulmonary artery and probably acts to dilate more or less the artery and conus. This, combined with the increased fluidity and velocity of the blood, readily accounts for the murmur in the latter case.

The cardio-pulmonary origin of all functional murmurs has had a few advocates. Potain is one of the most prominent of these. That murmurs may thus be produced at times and heard at any point over the præcordia can not be doubted. Hoover puts forward the experience of Francois Franck as illustrating the possible origin of murmurs in this manner. Franck was operating on a dog when a systolic murmur developed. He introduced a tenaculum through the pleura overlying the heart and withdrew a tongue of lung, when the murmur disappeared. On replacing the tongue of lung, however, the sound again became audible. Talbot Jones calls attention to the fact that there are two kinds of cardio-pulmonary murmurs, one being due to the forcible expulsion of air from the lung by the heart striking it, and another resulting from the suction action of the heart on the lungs, drawing them in during contraction.

The murmur of relative insufficiency at the mitral orifice has been mentioned, incidentally, in speaking of Balfour's theory. This murmur may be due to simply an inability on the part of a weakened

cardiac muscle to squeeze the orifice into systolic shape; to a temporary dilatation or hypertrophy of the heart resulting from debility or disease, combined with an overstrain of the cardiac muscle, or to a temporary leakage due to unequal tension of the valve leaflets or defective innervation of the fibro-muscular ring of the orifice resulting from excitement. Such a murmur has been recognized by so many authorities as to place it above question as a distinct clinical entity. Hayden, McAlister, Balfour, Bristowe, Butler, Osler, Garland, Root, and many others have accepted this origin for certain apical systolic murmurs, and Anders is inclined to believe that all functional murmurs are due to relative insufficiency.

The safety-valve action of the tricuspid orifice when the blood tension becomes too high has also been accepted by equally as many authorities as a cause of other systolic murmurs heard over the lower end of the sternum. Blood tension sufficiently high to produce this murmur, however, is usually due to some organic lesion of the left heart or lungs.

Among other causes which have been suggested as being productive of functional murmurs at times, the following are mentioned: Pressure on the pulmonary artery by the heart during systole, squeezing it against the chest wall, as a result of the retraction of the lung from the base of the heart (Quincke); spasm of the columnæ carneæ, preventing perfect closure of the valves (Upshur); disproportion between the size of the ventricular cavities and the length of the chordæ tendineæ and musculi papillares (Bristowe); a lateral displacement of the origin of the musculi papillares on account of dilatation of the heart (ibid.); imperfect closure of the valves from rapid heart action or a disturbance of the pneumogastric nerve from gastric disorders (Conkling); a dilatation of the alveoli of the lungs from frequently holding the breath, as in heavy lifting or hard labor, accompanied by a temporary stagnation of the blood and its sudden release—this becoming a habit and inducing chronic changes (ibid.); friction between the pericardium and the chest wall caused by a wrinkling of the former or by the "white patch" on the wall of the right ventricle (ibid.); pleuropericardial friction (Syers); pericardial and phrenic friction when the stomach is distended with gas (Root and others); palpitation of the heart from nervous causes (Allbutt); sonorous vibrations transmitted to the stethoscope by a peculiar ventricular shock at times and, on other occasions, vibrations of the conus arteriosus of the right ventricle (Drummond). Finally, Davidson would explain all murmurs by vibrations set up in the valves of the heart by impact of the blood stream at an oblique angle.

CLASSIFICATION.

From the foregoing rather chaotic mass of evidence and theories I have attempted a classification, mainly from the standpoint of origin, of the following murmurs:

I. Systolic.
- **1. Vasculo-hæmic.**
  - ***a.*** **Dilato-hæmic.**
    - **Asthenic type.**
    - **Sthenic type, or Cardio-adolescent.**
  - ***b.*** **Constricto-hæmic.**
- **2. Cardio-pulmonary.**
  - ***a.*** **Cardio-bronchial.**
  - ***b.*** **Cardio-vesicular.**
- **3. Dynamic, or Cardio-muscular.**
  - ***a.*** **Depresso-dynamic.**
  - ***b.*** **Excito-dynamic, or Neuro-dynamic.**
- **4. Pericardial, Pleuro-pericardial, and Pericardiophrenic friction sounds.**
- **5. Musical.**

II. Diastolic.

SYSTOLIC.

Vasculo-hæmic murmurs.

I have applied the term *vasculo-hæmic* to those murmurs the origin of which depends upon a dilatation or a constriction of a blood vessel, plus an increase in the velocity of the flow and, at times, a change in the quality of the blood. It has been conclusively proven by the experiments, which I have mentioned, that a dilatation in a tube through which a fluid is made to flow will cause a murmur if the velocity is sufficiently rapid, and murmurs have been so produced experimentally in the pulmonary artery and aorta. Seventy-six post-mortems have been mentioned in which the pulmonary artery and conus, in whole or in part, lay beneath the pulmonary area, so it can be seen that the murmur of a dilated pulmonary artery would be readily transmitted to this point. It has also been shown from numerous autopsies that a dilatation of the pulmonary artery and conus really exists in many cases where the pulmonary murmur has been present during life. These facts indicate, almost beyond doubt, that the dilatation of the artery plays an important part in the production of a portion, at least, of the murmurs heard over the pulmonary area.

Certain experiments mentioned have proven that a constriction is equally productive of murmurs. Russell, and others have thought that the left auricular appendix could produce sufficient pressure on the pulmonary artery to cause a murmur when the heart and appendix were dilated, and Janeway regards this possible during forced expiration when no dilatation exists. Foxwell, however, found from his experiments that the left auricular appendix under no cir-

cumstances could produce sufficient pressure to cause a murmur, and Ball had previously arrived at the same conclusion. Moreover, the left appendix is comparatively empty when ventricular systole takes place—the time when the great majority of the murmurs occur in the pulmonary area—so that, practically, the only pressure that is brought to bear upon the pulmonary artery at this time is produced by the comparatively thin walls of the appendix. Quincke, from his post-mortem findings, thought that the artery was compressed during systole by the whole heart, owing to a retraction of the lungs from the base, but it seems improbable that this would occur, as the heart under such conditions while lacking a cushion, so to speak, against which to press the pulmonary artery, would have more working room than before. Speaking entirely from a theoretical standpoint, it would seem that the most likely source of pressure, if pressure really enters at all as a factor in the production of the pulmonary murmur, would be by the systolic distention of the aorta. This vessel lies in immediate proximity to the pulmonary artery within the pericardium and is not only the least compressible of the two structurally, but the blood pressure within it is much the greater during systole. Cardiac muscular debility from any cause would lessen the resisting power of the walls of both arteries and permit of greater systolic distention, so that they would mutually press against each other. The pulmonary artery, however, being the weaker and the more compressible, would naturally be the more constricted of the two.

Dilato-Hæmic Murmurs.

Under the term *dilato-hæmic*, I have grouped the "anæmic," "hæmic," and "cardio-hæmic" murmus of the pulmonary area, described by certain writers; the "murmur of the dilated pulmonary artery" of Conkling, and the "pulmonary murmur" of Foxwell.

ETIOLOGY.

Anæmia and debility.—Among the clinical causes of this murmur anæmia is put at the head of the list, not on account of its relative frequency as an exciting cause, but on account of its long association with it. The murmur frequently occurs as a complication in anæmia, but it may also complicate any other disease or condition which produces, as does anæmia, debility of the heart muscle and rapid pulse, provided the heart is subjected to sudden strain. Without a sufficient amount of strain to produce a dilatation of the pulmonary artery, it is doubtful if a murmur can occur from these causes. Anæmia being one of the first diseases to be found in association with the blowing sytolic murmur heard most frequently at the pulmonary area, this murmur came not only to be known as the "anæmic"

murmur, but its origin was long claimed to be due to the changes in the blood brought about by the disease. Its "hæmic" origin, in fact, is still accepted by many authorities. Weber and Volet, as stated elsewhere, were both able, according to their reports, to produce murmurs in tubes of uniform diameter, and the latter produced them in rubber tubes with a velocity of current but little greater than that of the blood. These experiments were naturally taken to indicate the possibility, at least, of murmurs being caused by an increased rapidity in the flow of the blood, and the fact that in anæmia the blood is thinner and hence more easily thrown into vibrations made the hæmic origin exceedingly plausible. Recently, however, McLennon, of Toronto, reinvestigated the acoustic properties of fluids in tubes at the request of Rudolf, and he came to conclusions which are decidedly at variance with those of Weber and Volet, so far as the production of sounds in tubes of uniform diameter is concerned. Rudolf quotes these conclusions as follows:

1. A fluid of any kind flowing at any speed through a cylindrical tube will not cause a murmur so long as the tube retains its cylindrical form.
2. A fluid flowing from a cavity into a cylinder creates no sound.
3. A fluid flowing from a cylinder into a cavity causes a sound if the flow is rapid.
4. A constriction in the tube produces a sound.

Such conclusions, of course, practically deny even the possibility of a murmur being caused by changes in the character or rapidity of flow of the blood without some additional factor. The fact, also, that the murmur found in anæmia is not heard with greater frequency over the aortic area proves rather conclusively, as pointed out by Hoover, that something more is needed to produce this murmur than changes in the character and velocity of the blood, as the flow of blood is more rapid and more powerful in the aorta than in the pulmonary artery. Many cases of anæmia have been reported in which the blood was greatly altered and which were unassociated with a heart murmur of any kind. These were probably cases which had not been subjected to heart strain, and a further proof of this is shown by certain reported cases of patients who were convalescing from acute infectious or febrile diseases and who developed a murmur only when they had become sufficiently well to get out of bed and began to exert themselves.

The systolic murmur found at times over the aortic area in anæmia and kindred conditions is probably rarely due to a dilatation of the aorta, which has been proven to occur only as a result of great pressure or disease, but is most likely a murmur transmitted from another area or is of cardio-pulmonary origin. In some instances it may be constricto-hæmic.

The dilato-hæmic murmur is frequently heard in chorea, chlorosis, exophthalmic goitre, the acute infectious and febrile diseases, delicate women and children below par, but it is even more frequent in comparatively healthy young men who have subjected themselves to heart strain.

Heart strain.—As previously stated, a necessary factor in the production of this murmur is cardiac overstrain, and this may occur either as the result of violent and sudden exertion or of only relatively severe exertion when anæmia or debility exists, or when the general muscular apparatus is unprepared to sustain it. In either case there is a damning back of the blood upon the pulmonary artery and right heart, causing a dilatation of the artery and conus. Athletes, runners, oarsmen, and, as Conkling points out, "those who demand instantly and for a relatively short time increased exertion while in the interval there is no extra demand" are prone to develop this murmur. Patients convalescing from a protracted illness and who may attempt to get out of bed before their strength is regained are frequent subjects.

Excitement.—Excitement plays a very important part in the production of this, as it does in almost every other functional murmur. The combination of muscular debility or weakness, heart strain, and excitement seems to be one that is most frequently found in association with the dilato-hæmic murmur. Excitement alone, unless excessive and prolonged, can hardly be responsible for the murmur, though Jacobi states that strong emotions, if prolonged, especially in the young, may influence the heart even to change of structure. The rapid and tumultuous heart action which is always found associated with excitement is probably the factor influencing the production of murmurs.

Rudolf quotes Sir William Broadbent as calling especial attention to the frequency with which this murmur is found in young men undergoing examinations. Speaking of certain candidates taking the examination for Woolwich and Sandmurst, he says:

> The candidate has usually been spending long and late hours in study and restricted exercise and limited fresh air, and with possibly unlimited tobacco. He presents himself for medical examination in a state of extreme nervous excitement. His pulse is rapid and perhaps irregular, his cardiac impulse violent, and may be diffused beyond the right sternal border. Murmurs may be heard at one or more orifices.

The cases which I have mentioned in my own experience presented practically the same symptoms.

Adolescence.—The murmur is found most frequently during adolescence, though it is also found later in life. It is in the former class of patients, however, in which we find most often the combination of exciting causes which has been mentioned as being so frequently productive of this murmur.

Aneurism.—Aneurism of the ascending portion or of the arch of the thoracic aorta may produce a dilato-hæmic murmur over the aortic area. Such a murmur can not be considered functional in any sense, but it is mentioned on account of its similarity in origin and because it is necessary to exclude it in making a diagnosis of functional murmurs at this area.

SYMPTOMS AND PHYSICAL SIGNS.

In regard to the symptoms and physical signs of this murmur, a distinction must, I think, be drawn between the murmurs associated with systemic disease or debility and those occurring, principally during adolescence, as a result of excessive heart strain in persons in comparatively good health. The former, therefore, I have called the "asthenic" type and the latter the "sthenic," or cardio-adolescent. There is a variation in the descriptions of the physical signs and symptoms of the dilato-hæmic murmur that can, I think, be accounted for in this way. Several writers have apparently combined the two types in their descriptions, and these are in consequence rather indefinite in character.

Asthenic type.—In the asthenic type there is not believed to be present such a marked dilatation of the pulmonary artery and conus as in the sthenic, and consequently there are not found the same signs of cardiac enlargement and displacement of the apex beat as in the latter.

The symptoms accompanying murmurs of this type are those only, as a rule, which result from the general debility or disease associated with it. Dizziness, palpitation, dyspnœa on exertion, dyspepsia, mental irritability, pallid and toneless skin, cold extremities, and pulsating jugulars, may be present as a result of anæmia or debility; and, rarely, cyanosis and œdema about the ankles may occur in the severer forms of anæmia. Rapid and tumultuous heart action is a constant accompaniment.

The murmur present is usually soft and blowing. There seems no good reason to believe that the sound is ever harsh when the dilatation of the artery and conus is moderate and where no constriction exists. When the dilatation is marked, as in the murmur described by Foxwell, and the artery is curved upon itself and constricted against the chest wall, the sound is rough. The time is systolic, and the sound is best heard usually over the second left interspace close to the sternum. Rarely it may be best heard in the aortic area. When the maximum audibility is in the second left space, the sound may also be heard at times, less distinctly, over the aortic area, along the left parasternal line, at the apex or over the fourth left space near sternum. It is also reported to have been heard faintly in the

interscapular region at times. It is best transmitted upward and outward toward the left shoulder. When anæmia is present, a venous hum is sometimes heard in the veins of the neck.

The same causes which produce dilatation of the artery and conus are responsible, at least during the time these causes prevail, for an accentuation of the second pulmonic sound. The amount of accentuation present will depend somewhat upon the physical status of the case at the time of the examination in respect to the degree of debility, excitement, and arterial tension then present. According to Bramwell, the accentuation is due at times to an imperfect emptying of a full left auricle by a weakened systole and a consequent damming back of the blood upon the pulmonary artery. At other times he thought the accentuation might be more apparent than real, owing to a weakened aortic second sound.

The murmur never takes the place of the valvular sounds and there are no signs of cardiac enlargement, excepting, perhaps, a very slight increase upward at times in the percussion dullness. The sound is more intense on exertion, in the recumbent position, and at the end of expiration. A deep inspiration may cause it to become less audible. Pulsation may be present in the second, third, and fourth left spaces, and the pulse is " thrilly " and rapid.

Sthenic type, or cardio-adolescent.—Murmurs of the Sthenic type may at times be accompanied by dizziness, faintness, palpitation, and dyspnœa on sudden exertion, but frequently the patient feels and looks to be in good health. His muscular development may be somewhat deficient, but it may likewise be unusually good in some cases. The pulse is rapid and tumultuous, and during excitement the patient's extremities may be cold and skin pallid.

This murmur has the same time as the asthenic type and is heard in the same areas with the same relative degree of intensity, except that it never has its maximum intensity in the aortic area. It is also transmitted in the same general direction and is affected in a similar manner by exertion, posture, and respiration. The characteristic features about it are (1) that it is usually loud, harsh, and blowing; (2) it is usually accompanied by a marked accentuation of the second pulmonic sound, and (3) there are signs of cardiac enlargement and displacement of the apex beat. The percussion dullness is markedly increased upward when the dilatation of the conus and artery is extreme, reaching the middle of the third rib, or higher, instead of the upper border of the fourth, as usual. In the supine position this is more marked, and the dullness extends somewhat to the left. The apex beat is pushed upward and outward and may reach the fourth space near the nipple line. This displacement also is more marked in the supine position.

Constricto-hæmic murmurs.

As previously stated, there is a possibility that a certain number, at least, of the systolic murmurs heard over the pulmonary area may be constricto-hæmic in origin. At the present time, however, no distinction can be made between the physical signs presented by the murmurs of this class, if they exist at the pulmonary area, and the dilato-hæmic murmurs. There are, however, certain murmurs of this class which are well recognized. The sound heard over the subclavian artery, due to muscular, stethoscopic, or other pressure, is one of these. This sound is frequently heard in health, but it may be due to the pressure of a thickened pleura or of a consolidated apex of tubercular origin.

Similar sounds may be heard over the vessels of the neck at times, and it is probable that the venous humming heard rarely in the great intrathoracic veins is due to constriction of some kind. The pulmonary systolic murmur has been attributed by some theorists to the humming of these veins. The pressure, in such a supposition, would of necessity have to be made during systole either by the heart itself or by the distention of the aorta.

The constricto-hæmic murmurs of the subclavian and other vessels are readily recognized and require no further mention.

Cardio-pulmonary murmurs.

ETIOLOGY.

Functional murmurs produced by the action of the heart against a portion of lung tissue in immediate proximity to or overlying it have long been recognized. It is not believed that any clinical cause is necessarily associated with these murmurs, as they are heard at times in persons who are apparently in good health. They are frequently found, however, in connection with certain pathological conditions.

Emphysema.—Butler is inclined to believe that a certain amount of emphysema, either localized or compensatory, is necessary for their production; and it must be admitted that the presence of an emphysematous patch of lung tissue overlying or in the immediate neighborhood of the heart offers a very plausible explanation of the origin of the sound. No pathological proof is offered, however, for this belief, and it has yet to be shown that normal lung tissue similarly placed would not cause a murmur before it is necessary to believe that emphysema exists in every case.

Tuberculosis.—Tubercular consolidation of the lung is known to be frequently associated with this class of murmurs, especially the cardio-bronchial type. Putnam quotes Squires as reporting 23 cases of the cardio-pulmonary murmur, of which 14 were consumptive.

Neurasthenia.—It has been mentioned that Putnam found 30 murof this class in 400 examinations made by him at the Massa-

chusetts General Hospital. Of these, he states that 26 were in neurasthenics and 4 in nonneurasthenics. He places the percentage of the occurrence of the murmur in nonneurasthenics as from 1 to 2 per cent and in neurasthenics as from 8 to 10 per cent. He thinks that young and middle-aged neuropathics and asthenics who are spare in build, long chested, and with rather weak muscular systems and elastic chest walls, are the most frequent subjects. He regards the murmur rare in vigorous persons even when they are temporarily ill. Drummond thinks, also, that these murmurs, as well as all other functional murmurs, are more frequent in neurotics.

Excitement.—Excitement, with its accompanying rapid and tumultuous heart action, is usually found associated with all murmurs of this class.

Sex.—The murmur is more frequent in males. Matthews reports 32 cases, of which 23 were men and 9 women.

SYMPTOMS AND PHYSICAL SIGNS.

In none of the descriptions which I have seen of this murmur, has any distinction been made between those murmurs originating in the bronchi and those produced in the infundibula and air cells. There are certain well-marked differences between the physical signs presented by these two types of murmur, and I shall speak of them separately, the former as the *cardio-bronchial*, and the latter as the *cardio-vesicular*. The latter term has the disadvantage of having been used as descriptive of all cardio-pulmonary murmurs, but its use should, I think, be limited to those murmurs which have a predominance of the vesicular sound.

Cardio-bronchial type.

The cardio-bronchial murmurs are short and whiffing in character; usually systolic, or post-systolic, in time, but rarely may be diastolic, the sound being then due to the suction action of the heart; not confined to any area, being heard at either apex or base; variable in constancy, appearing and disappearing during the respiratory cycle and with change of posture, depending upon the relation of that portion of the lung tissue in which they originate to the heart; heard over a limited area and transmitted only in the direction of consolidated lung tissue when this is present. In the latter case the murmur may be heard at times in the axillary line or back. When the sound is produced in a portion of lung overlying the heart it is very superficial in character and can sometimes best be heard with the unaided ear. Forced inspiration or expiration, holding the breath, or prolonged rest will frequently obliterate it, while exertion or excitement will usually increase its intensity. It may disappear on lying down, or its intensity may be increased. Pressure on the chest wall

by an assistant may cause the sound to disappear. The size, position, and valvular sounds of the heart are normal.

It is doubtful if the pure cardio-bronchial murmur, unaccompanied by any vesicular element, can occur unless a consolidated patch of lung tissue lies between the bronchi in which the murmur originates and the heart or unless a localized emphysema exists. Symptoms, therefore, referable to one or the other of these conditions may be associated with it.

Cardio-vesicular type.

The cardio-vesicular murmur, when pure, is soft and breezy in character. There is frequently present, however, more or less of the bronchial element and an admixture of the whiffing sound which characterizes it. The murmur has the same time and is heard in the same areas as the cardio-bronchial murmur. It is much more constant, however, and may usually be heard during the whole of the respiratory cycle. It is also less affected by change of posture and is not transmitted.

There seems to be no good reason for believing that this sound may not be heard in health.

Dynamic or cardio-muscular murmurs.

We come now to the *dynamic* or *cardio-muscular* murmurs. The term dynamic was originally applied by Walshe and others to those apical systolic functional murmurs which were supposed to originate within the heart itself. I have accepted this definition of the term and have grouped under it only murmurs of this class. Such murmurs have been described under the titles "cardio-muscular" (Coleman and others), "myocardial" (Jacobi and others), "murmur of rapid action" (Conkling), "murmur of relative insufficiency" (Butler, Anders, Osler, and many others), etc. Drummond has described a murmur somewhat similar in physical signs to some of those of this class, which he calls "neuro-typtic." He believes it to be due, however, to sonorous vibrations transmitted to the stethoscope by a peculiar ventricular shock. The murmurs which I shall describe under the term "dynamic" are believed to be due to a relative insufficiency at the mitral orifice. Relative insufficiency at other orifices of the heart occurs so rarely, except as a result of serious organic disease of the heart or elsewhere, that the murmurs so produced can not properly be considered as belonging to the general class of functional murmurs.

The dynamic murmurs appear to me to fall naturally into two groups, one in which cardiac debility, due to intrinsic disease of the heart muscle or resulting from general debility or depression, exists as the principal exciting cause, and another in which there is a predominance of the neurotic element entering as a causative factor. I

have called the former the *depresso-dynamic* and the latter the *excito*, or *neuro*, *dynamic*, and between these types there is not only a difference as to origin, but also as to the symptoms and physical signs presented.

ETIOLOGY.

The depresso-dynamic murmur is found associated frequently with the same diseases and conditions which have been mentioned as accompanying at times the dilato-hæmic murmur. Any disease or condition, in fact, which produces general debility, or which has as a complication an acute myocarditis, may act as a factor in the causation of this murmur. Cardiac overstrain also plays an equally important part here as in the dilato-hæmic murmur. When it does not act to dilate the pulmonary artery and conus, it may cause a relative insufficiency at the mitral orifice and, rarely, may do both. A temporary dilatation or hypertrophy of the heart may occur and be accompanied by a relative insufficiency at the mitral orifice, both of which may disappear when the heart regains its strength. When no ventricular dilatation or hypertrophy occurs, the murmur may be caused, as previously stated, by simply an inability on the part of a weakened ventricle to squeeze the mitral orifice into systolic shape and a consequent failure of the valves to close the larger opening.

The excito or neuro dynamic murmur occurs probably as a result of imperfect closure of the valves at the mitral orifice, due to unequal tension of the valve leaflets or defective innervation of the fibro-muscular ring surrounding the orific accompanying rapid heart action and excitement. It is frequently found in neurasthenics and persons of nervous temperament, but it may occur as the result of excitement from any cause. Palpitation of the heart from fright, dyspepsia, loss of sleep, or the excessive use of tobacco, tea, or coffee, may produce a murmur of this character.

SYMPTOMS AND PHYSICAL SIGNS.

Balfour claimed that all of the symptoms accompanying the organic mitral regurgitant murmur may occur as a result of the dynamic murmur if it is sufficiently prolonged, and from its nature this can not be doubted. An actual regurgitation takes place in these cases, and the logical results of this damming back of the blood upon the lungs and right heart must follow if time permits. Usually, however, the dynamic murmur disappears before these symptoms become prominent, and the only symptoms found, as a rule, will be those of the accompanying debility or disease when such is present.

Depresso-dynamic murmurs.

The sound in the depresso-dynamic murmur is systolic and blowing; heard best at apex or fourth left space near sternum; transmitted to

the left, sometimes to the axilla or angle of scapula, and the apex beat may be displaced outward, the percussion dullness increased and other signs present indicative of dilatation or hypertrophy. The first sound of the heart is obscured and the pulmonic second sound accentuated. All of the signs, in fact, which accompany the organic mitral regurgitant murmur, with the except of the occasional presystolic murmur, may be found at times associated with this murmur, though rarely in a marked degree.

Excito or neuro dynamic murmurs.

The excito or neuro dynamic murmur has the same time and area of maximum audibility as the murmur just described. It may also be transmitted in the same direction. The sound, however, is apt to be rougher in character and there are rarely any signs of dilatation or hypertrophy. The obscuring of the cardiac first sound and the accentuation of the second pulmonic are not so marked. The pulse is rapid and turbulent as a rule. Prolonged rest, the recumbent posture, or a deep inspiration will frequently cause the sound to disappear, or will diminish its intensity. It is usually loudest when standing, after exertion, during excitement, and at the end of expiration.

Pericardial, Pleuro-pericardial, and Pericardio-phrenic friction sounds.

Under the heading of systolic murmurs we have now only to consider the rather frequent, but unimportant friction sounds, and the rare musical murmurs. The differentiation of the former from similar sounds due to inflammatory lesions is usually easy as the sounds which are not due to such lesions are unaccompanied by any symptoms referable to themselves and are unassociated with any disease. Sometimes such sounds may be produced by friction between the pericardium and diaphragm when the stomach is distended with gas, and Conkling speaks of a grating, harsh, and hard friction sound heard either during systole or diastole at the right or left of the apex, produced by friction between the chest wall and either the wrinkled pericardium, the conus arteriosus of the right ventricle, or the " white patch " on the wall of the ventricle. A functional pleuro-pericardial friction sound is spoken of by Syers. Such a sound is probably due to a patch of thickened or adherent pleura resulting from an old inflammation.

Musical murmurs.

In regard to the musical murmur, the concensus of opinion seems to be that they are usually either congenital or the result of organic heart disease—most often aortic. They are produced at times by fibrous bands stretched across the ventricle in such a way as to be

tightened by the contraction of the heart and caused to vibrate by the blood current. Lewis states that such bands are almost always in the left ventricle and the sounds systolic. On other occasions fenestrated valve cusps have been found at autopsy and have presumably been the sound-producing element. A thin stiffened edge of a cusp or a fibrous band swinging free in the ventricle may be responsible. Babcock, who states that accidental musical murmurs are rare, reports one associated with a "haemic" murmur in an anaemic girl of 19, which disappeared with the "haemic" murmur when health was regained. He thinks that the rapid heart action may have put an aberrant cord on the stretch and set up vibrations which caused the murmur. He concludes that the cause of a musical murmur is a matter of conjecture until autopsy, and it might be added that it sometimes remains a conjecture even after autopsy.

DIASTOLIC MURMURS.

Most authorities are agreed as to the comparative rarity of the diastolic functional murmur, and a few doubt if they are ever heard except as a result of organic lesions of the heart or elsewhere. The occurrence of aortic and pulmonary diastolic murmurs due to a temporary dilatation of these orifices without lesions of the valves, has been established beyond doubt by many reported cases with autopsies. Such cases, however, are almost always associated with organic lesions of aorta, lungs, or pericardium. Fisher has reported 10 cases associated with adherent pericardium; Gibson reports two cases and quotes Corrigan, Chevers, Bellingham, Peacock, Perle, Besnier, Cockle, Pel, Chauffird, Finlayson, Bonveret, Pitt, Gairdner, and Cabot and Locke as reporting other cases of undoubted diastolic murmurs, apparently originating at the aortic orifice, without valvular lesions; and Conkling reports a case of double aortic murmur due to an atheromatous patch in the aorta beyond the valves. Murmurs of relative insufficiency in the pulmonary artery due to high tension have been recognized since 1881, when they were first described by Steell. They occur usually only as a result of mitral disease, though, as Shaw points out, any condition which interferes with the onward progress of the blood in the pulmonary artery may produce them. Aortic insufficiency from the above cause probably occurs only as a result of a weakening of the aortic basal ring by disease.

Putnam, Jones, and others state that the cardio-pulmonary murmur may occur in diastole, and there seems to be no good reason for doubting that the heart may act at times to draw air in as well as to drive it out of the bronchial tubes and air cells. Drummond, Butler, Shattuck, Davis, and Root are among those who speak of diastolic murmurs without organic lesions.

In connection with diastolic murmurs due to temporary dilatation of the aortic and pulmonary orifices resulting from organic lesions

of the aorta, lungs, pericardium, etc., I wish to suggest the term *extracardial organic* for all murmurs due to organic lesions outside of the heart. This would distinguish them from the purely functional and from murmurs due to organic disease of the heart muscle or valves which could be grouped together under the term *intracardial organic*.

CONCLUSION.

In conclusion, I wish to add just a word in regard to the significance of the so-called functional or accidental murmurs. We have seen that while these murmurs are functional in the sense of their not being due to organic valvular disease, a certain number of them are dependent for their production upon disease or debility of a more or less temporary character of either the heart muscle, the tissues in immediate proximity to the heart, or of the body elsewhere. It has been shown that a purely functional murmur, however, may occur at any point over the præcordia during comparative health, and that unless there are signs of cardiac enlargement, venous engorgement, or systemic disease coexistent with a murmur it can not be taken as indicative of either organic heart disease or of serious ill health. The presence of a murmur, therefore, should merely put us on our guard as examiners and cause us to look for other signs which alone will determine the true significance of the sound.

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SPLENECTOMY—A CASE.

By Surg. H. C. CURL, U. S. Navy.

Among the causes of chronic enlargement of the spleen, malaria, of course, far exceeds all others. While occasionally seen in temperate climates, its occurrence is rare as compared with the number seen in the Tropics, where malaria is prevalent. Enlarged spleens are frequently seen in the service on the Isthmus of Panama, and specimens filling the entire left side of the abdomen are by no means rare. The patient with such an enlargement is usually very anæmic, debilitated, and subject to frequent attacks of malaria. He is unable to work at anything but the lightest class of labor, is sallow, and, in the cases of very great enlargement, has a distinct gait which gives one the impression of extraordinary care being used in walking. At times it almost approaches the gait of late pregnancy.

Other cases in which the spleen is not so large will be discovered on examination where there has been no suspicion that such a condition existed and where there has been very little reaction and reasonable health the rule.

The case I wish to report is of interest because of the size of the spleen, which weighed over 5 pounds, and the occurrence of severe malarial fever during the first three weeks after operation. (In this connection I wish to acknowledge the great assistance rendered during the operation and afterwards by Dr. Lloyd Noland and Dr. Norman Williamson, of the Colon Hospital staff.)

The patient was a mulatto 36 years of age, and up to three years before had enjoyed good health. Previous history is unimportant, except for numerous recurring attacks of malaria. He did not take quinine regularly; in fact, he reached a point where he seldom took any medicine even when suffering from acute attacks. His health gradually failed until upon admission to hospital he was a typical malarial cachectic, with splenic enlargement.

While realizing the gravity of the operation, it was considered justifiable as the only means of restoring in part his strength and

enabling him to earn his living. Examination showed a tall, anæmic man, with sallow, dusky skin, almost colorless lips, a protruding abdomen, a general emaciation, and a peculiar gait. An anæmic murmur in the pulmonic area was the only abnormality found in the chest. The examination of the abdomen demonstrated a spleen which extended downward to the crest of the ilium and anteriorly 2 inches beyond the median line. When recumbent there was a difference of about 2 inches in each of these directions. The organ was movable, not tender, and through the thin abdominal wall could be palpated perfectly. A trace of albumin was found in the urine, and the patient was running an irregular malarial temperature usually not more than 101. The pulse was not strong, though regular.

The blood contained tertian parasites in moderate numbers, and a count resulted as follows: Erythrocytes, 1,312,000; whites, 5,000. Differential count: Polymorphonuclear, 32.7 per cent; lymphocytes (large), 25.3 per cent; lymphocytes (small), 34.1 per cent; eosinophiles, none; neutrophilic myelocytes, 3.7 per cent; transitional, 3.7 per cent; hemoglobin was 24 per cent.

Calcium chloride was used for six days, and strychnine was given immediately before operation. Special preparations were made for saline enemeta and transfusions. The incision used was the result of a number of experiments on the cadaver. As a large incision was needed to deliver a spleen of such size, various incisions were made during autopsy work, and the one determined upon was an ⌇-shaped one, similar to the " Bevan " incision, except reversed, beginning near the median line, 2½ inches below the tip of the xiphoid cartilage, carried to the left and downward through the rectus, then downward along the outer edge of the rectus, and terminating in a curve to the left. This incision can be criticised from a theoretical standpoint, but considering the fact of a spleen that was overlapped by the left lobe of the liver for 3 inches and extended as low as this one did, an incision giving ample room was essential. The circulation in the flaps was very satisfactory during healing. In splenectomies where the spleen is smaller a simple incision, either L shaped or that of Kocher, could be used.

The abdomen was opened for 4 inches. The hand was inserted and passed over all the surfaces of the spleen; the movability was tested, and it was determined that there were no adhesions and that enough motion was possible to enable ligatures to be placed on the vessels of the pedicle. The incision was continued downward and the lower end of the organ delivered. The pedicle, so called, was put under some tension by this procedure, and the greatest care was necessary to prevent tearing the splenic vessels. These vessels were of enormous size, as compared with those of a normal spleen, and were friable to

an alarming degree. For example, one large vein had been tied, but before the distal end could be secured it "pulled" completely out from the spleen, deluging the field with blood. This was controlled by the thumb of the assistant being thrust into the opening and kept there until the main arteries were tied. Clamps were freely used, the head of the pancreas dissected from its attachment to the capsule of the spleen, and as quickly as possible the entire organ delivered and cut away. A few smaller but troublesome vessels in the gastro-splenic ligament were secured and the work of ligaturing was completed. Rapid work was absolutely essential. As soon as sponging showed no more bleeding the abdomen was closed, gauze drains left in above and below, and the patient put to bed.

During the operation saline solution was used by transfusion, and large hot enemata were given as needed. Patient left the table in state of shock, but rallied nicely, and in two hours he was in a satisfactory condition.

The spleen, examined an hour after operation, weighed 5 pounds 4 ounces, was 11½ inches long, 6½ inches broad, and 3¾ inches thick.

The drains were removed in twenty-four hours. Convalescence was uneventful except for several severe malarial attacks; on a number of occasions the temperature rapidly rose to 106°, but came down under hydrochlorate of quinine with urea, intravenously, in 20-grain doses. The quinine was continued and the temperature gradually reached normal. Some hemorrhage from the bladder occurred on the third day, but did not continue. The blood examinations given below show the changes expected. Attention is called to the absence of eosinophiles or eosinophilic myelocytes. The increased number of leucocytes on the tenth day could be partially accounted for by a slight infection in the skin. There was no infection of the peritoneum and the superficial infection was unimportant.

The comparatively slight reaction after this splenectomy can possibly be explained by the supposition that the bone marrow, the hemolymph glands, and the glandular system, as a whole, had for some time been obliged to perform a substantial part of the splenic functions on account of its altered condition, and when called upon to assume it all were better prepared than they would have been under ordinary circumstances.

Patient continued to improve steadily for over a month, was out in a wheel chair, and ate well. On the thirty-sixth day there was, however, a sudden rise of temperature and drop in pulse, and on the thirty-eighth day death occurred rather suddenly. At autopsy the only change found was a large pancreatic cyst.

From our experience in this case we were impressed with the necessity of using the greatest care in *avoiding any tension on the splenic vessels.* The pedicle in a large spleen is usually short and the vessels tear at a touch.

Table of blood examinations.

	Parasites.	Erythrocytes.	Leucocytes.	Hemoglobin.	Differential white count.						Nucleated red cells.			Remarks.
					Polymorphonuclear neutrophiles.	Small lymphocytes.	Large lymphocytes.	Transitional.	Eosinophiles.	Neutrophilic myelocytes.	Normoblasts.	Megaloblasts.	Microblasts.	
				Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*		*Per ct.*				
Before operation...	Tertian malaria ..	1,312,000	5,000	24	32.7	25.3	34.1	3.7	0	3.7	0	0	0	Poikilocytosis, polychromatophilia, many shadows.
Third day after operation.	Many tertian malaria.	2,228,000	7,800	30	66⅔	5	16⅔	3⅓	0	8⅓	Many.	Few	Few .	Poikilocytosis; polychromatophilia, some shadows, staining of plasma.
Ninth day after operation.	None	2,604,000	15,400	.....	75⅔	5⅓	9⅓	2⅓	0	7	Many.	Very few.	0	A very few shadows.
Sixteenth day after operation	None	2,268,000	17,100	28	84	1	7⅓	1⅓	0	2	Many.	Very few.	0	Poiklocytosis, shadows; 2 basophilic myelocytes.
Twenty-first day after operation.	Present.....	3,004,000	9,600	34	73	4⅓	18	1	0	1⅓	Many.	Many.....	0	Slight poikilocytosis.

AN OPERATION FOR INTERNAL HEMORRHOIDS.

By Passed Asst. Surg. B. F. Jenness, U. S. Navy.

The following operation for the radical cure of internal hemorrhoids is offered to the service, not as a substitute for the Whitehead or ligature methods, but as one particularly adapted to those cases in which the tumors are pedunculated, and as a safer method than others under circumstances sometimes met with on board the older ships when the surroundings are not of the best for aseptic surgery, especially surgery of the rectum.

The dangers from the open methods of treating hemorrhoids, which include the Whitehead, clamp and cautery, ignipuncture, crushing, incision, and the injection of carbolic acid seem to be, first, infection through the inferior hemorrhoidal veins and lymphatics; second, intermediary and secondary hemorrhage, and third, stricture of the rectum.

The disadvantages of most of these operations, as met with clinically, are the tedious, bloody procedures necessary and the inconvenience to the patient of a slow convalescence.

The method here given is intended to obviate many of these dangers and disadvantages, and to permit operations to be done under less favorable circumstances, but with better and more speedy results than formerly.

The feature of the operation is a continuous suture of the entire pedicle of the tumor before removal, thus closing all avenues of venous and lymphatic communication between the rectum and the general circulation before amputation of the pile is done.

Hemorrhage, which in the champ and cautery method is often troublesome, is practically impossible either during operation or after the patient is returned to bed.

The columnar piles or pillars of Glisson sometimes contain one of the descending parallel branches of the superior hemorrhoidal artery and may give considerable hemorrhage in open operations, while the nævoid or capillary piles situated high in the rectum will ooze for several hours after incision. If such tumors can be clamped and sutured they may be removed without fear of hemorrhage.

The contraction of tissue inevitable after operation by clamp and cautery or the Whitehead method may be considerable, and in removing a large rosette of piles the danger of stricture is a real one. One of the advantages claimed for the clamp and suture method is the slight danger of such stricture, as the contraction is no greater than that from a linear cicatrix after suture of any wounded mucous membrane.

The method to be described has been used in eight cases in the service. Four were operated on in the sick bay of the *Iowa*, and in

every case the patient was able to do duty in eight days. Four cases were treated at the New York Hospital, and the period of convalescence averaged the same as in the former cases. One case was seen and examined two years after operation. The rectum was found in normal condition and the patient stated that he had experienced no inconvenience since his return to duty.

The patient is prepared the day before operation by rest in bed, and is placed on a milk diet. Castor oil, ounce and a half, is given. On the morning of operation a soap enema of about two quarts is given, and the anal region is shaved and a bichloride dressing and T bandage applied. One-half hour before operation the patient receives a hypodermic injection of morph. sulph., gr. ¼, and atropine sulph., gr. $\frac{1}{60}$. On the table, after complete anæsthesia and dilatation of the sphincter, the rectum is washed out with warm sterilized water.

A single tumor is now grasped with a long, straight, thin-bladed artery or pedicle forcep. This instrument was found best adapted to the operation, as the ordinary pile clamp did not permit the operator to suture between it and the rectal wall.

The tumor should be grasped in the axis of the bowel. Care should be taken in this detail, as oblique or irregular cicatrices may cause contractures and sacculations, or ridges and furrows may be formed which will retard the progress of the natural contents.

A curved round needle of small diameter is threaded with No. 2 catgut, and with a small holder is passed through the flattened pedicle in a direction from above downward, the needle being introduced near the superior, that is, the rectal (not the anal), margin of the pedicle.

By carrying the needle, now free, and the suture over the point of the clamp the thread may be knotted, thus ligaturing a small section of the pedicle as in beginning any continuous suture. By alternately turning the handle of the clamp to the left and right the upper and lower surfaces of the pedicle will present, thus giving room for the entrance of the needle on one side, and its receipt on the other as the suturing is continued across the pedicle.

The stitch used is termed by seamstresses the "back stitch," and consists in entering the needle each time at a point midway between the last point of exit and the previous one on the same side of the pedicle.

To avoid confusion, begin the suture on the upper surface of the pedicle by entering the needle one-fourth inch from the ligature at the margin. Turn the handle of the clamp so that the needle can be seen emerging from the under surface. Draw the needle through the pedicle and then return it one-eighth inch behind the point of exit on the lower surface. Turn the handle again and grasp the needle with a holder, as it appears on the upper surface, and draw it through.

Now pass the needle through the pedicle one-fourth inch in advance of the point of exit and after turning the handle repeat the process of returning the needle from below. Continue in this manner until the entire breadth of the pedicle is sutured. The stitches should be drawn up as progress is made.

The thread is knotted at the inferior margin (margin nearest the operator) in exactly the same way as in finishing any continuous suture. The pile is now cut away with knife or scissors as close to the clamp as possible and the cut surface presenting in the jaws of the clamp is touched with actual cautery or with carbolic acid. The clamp is now removed and the linear crushed and cauterized area is smeared with carbolized vaseline.

The remaining piles are treated individually in the above manner. The result is a series of elevated seams of tissue projecting into the lumen of the bowel and running in the axis of the same.

These ridges are the future cicatrices, and vary in height and length with the size of the tumors and the breadth of the clamp.

The crushed mucous membrane sloughs very quickly above the sutures, and when the first packing is removed the ridges will be about one-half as prominent as at the close of the operation.

A suppository of opium, gr. I, is placed in the ampulla and this portion of the rectum is packed with long strips of iodoform gauze smeared with carbolized vaseline, 3 per cent. A bichloride of mercury pad is applied to the anal orifice and fastened by a T-bandage.

The packing is removed and the bowels opened with castor oil on the fourth day. The rectum is irrigated with warm creolin, sol. 1–40, and repacked. This process is repeated after each evacuation of the bowels during the next forty-eight hours, after which all packing is removed and the patient is given his clothes.

The bowels are kept freely open by salines for another forty-eight hours, when the patient should be ready for duty.

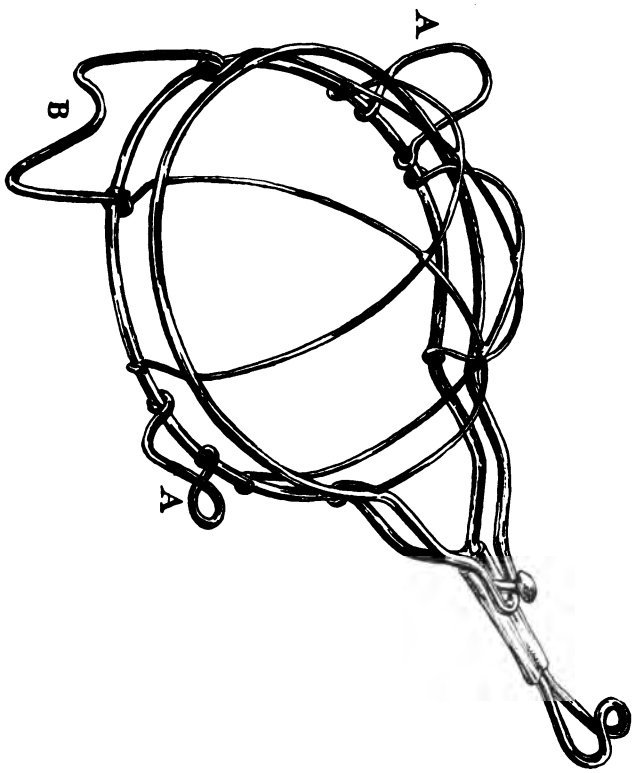

FIG. I.—SHOWS WHOLE MASK WITH ADDITIONS AS MARKED.

SUGGESTED DEVICES.

A MODIFICATION OF THE ESMARCH CHLOROFORM MASK.

By Asst. Surg. W. F. SCHALLER, U. S. Navy.

For general use on shipboard chloroform should be preferred to ether on account of the explosibility of the latter; and on entering into a naval engagement all ether should be thrown overboard. Chloroform is generally considered not so safe as ether, more immediate deaths from chloroform being recorded. But if administered with care, and remote as well as immediate dangers from their use be taken into account, we think that one is about as safe as the other.

The danger from an anesthetic comes from too great a concentration of its vapor. This is particularly true of chloroform at the beginning of the anesthesia, before and during the stage of excitement. We have devised a simple arrangement which guards in a great measure against this danger of chloroform anesthesia.

A wire attachment (B) $1\frac{3}{4}$ inches wide by $1\frac{1}{8}$ inches high is attached to the front of an ordinary Esmarch chloroform mask and at right angles to it. The base is slightly curved to fit the chin. This raises the mask and allows at all times an admixture of air with the chloroform. Two thumb holds (A A) $1\frac{3}{4}$ inches by $\frac{3}{4}$ inch provide a convenient means of holding the mask in place. It is especially recommended for use by the members of the Hospital Corps of our Department who may be called upon at any time to administer chloroform. The attachments may be readily improvised at short notice from an ordinary piece of copper wire.

CLINICAL NOTES.

RECORD OF A CASE OF SUPPOSED LOCOMOTOR ATAXIA, WITH INTERESTING POINTS IN DIAGNOSIS.

By Surg. N. J. BLACKWOOD, U. S. Navy.

T. H. D.; P. M.; age 31½. Reported at sick call on April 7, 1907, at which time there was a small epidemic of measles on the ship, presenting a measly eruption with a few interspersed macular spots; very slight rise of temperature; general malaise, but no catarrhal symptoms. He reported that he had not been on liberty since January 28, 1907, the ship having been at sea and in the West Indies all during the interval. Diagnosis was doubtful, but in view of the measles on board he was isolated, but not with the other measles cases. Eruption did not run the usual course of measles, but in about a week or ten days a small sore, not very characteristic, developed on his penis. On the 20th of April the treponema pallida was demonstrated in a smear from the sore on penis and the diagnosis of syphilis consecutiva made. Patient denies ever having had any venereal disease prior to this time. He is an unusually intelligent man for his position, and I believe his statements can be relied upon. He was then placed on the protiodide of mercury, under which treatment the eruption faded and the sore healed, the treatment being continued until August 1, when he went on leave and stopped his treatment. Patient remained in apparently perfect good health until about August 21. At this time he had some constipation, and while straining at stool he noticed that the urine was not flowing. On August 22 he was able to pass his urine with great difficulty, and the constipation continued. But on the evening of August 23 all efforts failed and he had to be catheterized. There was no stricture, and catheter passed easily. He was first seen by me at sick call on the morning of August 24, when it was ascertained that about two days before he had felt a little dizzy, or at least that he could not walk naturally, and that he dragged the left foot slightly in stepping over a hatch coaming, and that this condition had increased every day since. After careful examination the following condition was found: Left patellar reflex absent, right exaggerated; Romberg's symptom present and marked; marked ataxic gait; no Argyll-Robertson pupil and no disturbance of vision, past or

present; eye grounds seemed normal. Urinalysis: Color, clear straw; reaction, slightly acid; sp. gr., 1.005; albumin, a trace; no sugar.

Preataxic stage.—Pain in the back in the sacral region began on August 25 and increased for four days, when it disappeared, gradually leaving the sacral region and passing up the left side of the spinal column. This pain has been of a constant, hot, boring character, with remissions and exacerbations, but never lightning-like or sharp and shooting. No pain was ever complained of until this attack. No epigastric pain except such as was relieved by a movement of the bowels, and the only other pain was over the region of the bladder. Hot, burning, and prickling sensations in feet and legs for several days, increasing, and feeling as if soles of feet were padded. On taking a bath he could not tell whether it was hot or cold. Had an eruption of herpes on legs and arms about two months ago.

Ataxic stage.—Slight loss of power in left foot, followed rapidly in a few days by ataxic gait, complete loss of power of left foot, leg, and thigh, and of right foot and leg. Romberg's symptom pronounced from the beginning. Complete paralysis of both legs and feet and left thigh five days after first symptom was noticed. Coordination, power, and sensation completely retained in arms.

Sensory symptoms.—Cutaneous anæsthesia in spots and small areas on inner side of left leg, tips of small toes both feet, soles both feet. Right foot and inner side right leg almost entirely anæsthetic.

Other parts, cutaneous sensation good and can distinguish pin points an inch apart. No derangement of any of the special senses.

Visceral symptoms.—Retention of urine and constipation marked from the first. No gastric pain. No trophic changes. No cerebral symptoms. No ocular symptoms.

What is the diagnosis in this case?

Let us see what are the most prominent and characteristic symptoms.

First, the definite syphilitic history, in which the secondary symptoms are so closely mixed with the primary, and the tertiary (?) following so soon after the secondary.

Second, the paralytic symptoms and their rapid development.

Third, the absence of the knee jerk in the left or completely paralyzed leg and its exaggeration in the right or partly paralyzed leg.

Fourth, the bladder symptoms, constipation, and sacral pain.

The points in the differential diagnosis of this case are best presented by a few quotations from standard works.

In Gower's ataxic paraplegia a syphilitic history is rarely obtainable and the reflexes are increased. There is an absence of ocular and sensory symptoms in this disease, as there is in the case

under consideration, as well as sacral pain and involvement of t sphincters. Tyson says:

Ataxic paraplegia also displays ataxia, but here again eye symptoms a pain are absent. In *cerebellar disease* there is also loss of coordination, and t knee jerk may be absent; there may be headache, optic neuritis, and vomitir but no lightning pains or sensory disturbances. Occasionally neuritis mi present a clinical picture closely resembling tabes, known as peripher pseudotabes. The rapidity of development, the absence of the Argyll-Robertso pupil, and of implication of the bladder are the most important differentia features.

Osler says:

Some acute affections involving the dorsal columns of the cord may be followed by incoordination and resemble tabes very closely. In a case under my care the gait was characteristic and Romberg's symptom was present. The knee jerk, however, was retained and there were no ocular symptoms. The condition had developed within three or four months and there was a well-marked history of syphilis. Under large doses of iodide of potassium the ataxia and other symptoms completely disappeared.

The chief points that we find in this case which seem to be opposed to the diagnosis of posterior sclerosis are the absence of all ocular symptoms and all lightning pains, its very rapid onset, and the absence of any true preataxic stage. But again we may quote from Osler: "Eye symptoms may be absent in tabes, and there is a sort of antagonism between the ocular symptoms and the progress of the ataxia. Charcot laid considerable stress upon this, and both Dejerine and Spiller have since emphasized the point."

If this is a fact, which we have no reason to doubt, why might not this be a case in point? The rapid development of the disease has taken entirely the direction of the ataxic side and left the ocular free.

This, to me, is a most interesting case and one that is full of meat for study and discussion. I hope that it may prove so to others and that we may get the opinions of those with more experience than ourselves, thus aiding us to a correct diagnosis.

A CASE OF FRACTURED PATELLA TWICE FRACTURED AND TWICE SUTURED.

By Passed Asst. Surg. G. F. Freeman, U. S. Navy.

The right patella of the patient was fractured by a fall down a coaling hatch from the main to the gun deck on board ship. On June 27, 1906, an incision was made and a transverse fracture with five fragments was found to exist. Two small fragments were removed and the large fragments were separated into two parts with about 1 inch between. This space was filled with organized blood clot, shreds of capsule, and other detritus. The clots were turned out and the

FIG. I.—SHOWS THE TWO HEALED VERTICAL INCISIONS AND CONTOUR OF KNEE IN EXTENSION.

cavity flushed with hot normal salt solution; the fragments of bone and the capsular edges were approximated with chromicized catgut; a drainage tube was inserted and left in situ, interrupted sutures being used externally; the seat of operation was securely dressed, and the whole leg was bandaged to a long posterior splint to maintain a fixed position.

Convalescence from the operation was normal. On June 30 the drainage tube was removed, and on July 7 all sutures were removed and a plaster of Paris cast was applied. The patella united well and up to September 8 flexion and motion was good. On this date, contrary to the instructions of the medical officer and while unobserved, the patient indulged in a game of baseball and fell refracturing the same patella. The usual symptoms and signs, with effusion, were present. The patient refused further operation, and a posterior splint, with adhesive straps to keep the fragments in position, was applied.

On September 18, however, ten days after refracture, the patient changed his mind in regard to operation and requested one. A vertical incision, parallel to the first, was made and a transverse fracture found, the fragments being separated by blood clot. This clot was removed and the edges of the patella freshened by curetting, and the fragments and the capsule were approximated by chromicized catgut as before, but this time no drainage tube was inserted. A peculiarity of this fracture was that it did not occur at the site of the former fracture, which held firmly. On October 3 slight separation of the fragments was noted. The posterior splint with straps and bandage to retain patella in position was continued. Convalescence was uneventful, except that on November 3 the patient was again caught playing ball. Fortunately the posterior splint held and the patient did not fall. His neglect to follow instructions was not wilful, but due to natural carlessness and, perhaps, stupidity, for it is reasonable to suppose that one disastrous experience would have taught a sufficient lesson.

On December 11 X-ray examination revealed some separation of the fragments, but the patella moved as a whole and fibrous union was good. At this time the knee could be flexed to over 90 degrees, but further flexion was not attempted. A small posterior splint was continued.

On discharge to duty on January 5, 1907, the patella was firm and flexion was good. Two photographs of leg are submitted. In one the two healed vertical incisions can be indistinctly seen, and the general contour of knee as shown. In the second the knees in flexion can be seen. The right patella is not so prominent as the left, some of it having been removed and the patella as a whole having been lengthened. The flexion shows the good result of operation.

The case illustrates the value of opening up and suturing. A useful leg has finally resulted, and it is the opinion that this could never be accomplished except by operative procedure. At the second operation the amount of blood clot between the fragments would have precluded approximation of the fragments. A useful leg after one operation is always to be hoped for, but when the same patella is again fractured and the second operation gives a useful leg the case is considered worthy of note.

This case was left to my care by my predecessor, Passed Asst. Surg. U. R. Webb, U. S. Navy, and to him belongs the credit for the operations.

A CASE OF STRANGULATED INGUINAL HERNIA (RIGHT) IN A MALE WHO WAS OPERATED ON FOR THE SAME CONDITION ON LEFT SIDE EIGHTEEN MONTHS PREVIOUS.

By Asst. Surg. E. H. H. Old, U. S. Navy.

T. A.; Filipino; school-teacher in Cavite, P. I. Case paper 239, series 1907. Admitted to the U. S. Naval Hospital, Canacao, P. I., April 9, 1907.

Diagnosis.—Intestinal obstruction.

History.—Past: Was operated on here by Asst. Surg. H. W. Smith, U. S. Navy, for a large strangulated inguinal hernia (left) on November 18, 1905. Hernia extended into scrotum. Radical operation; no resection necessary. No trouble with that side since, but a hernia has appeared on the right side, which he has been able to reduce.

Present: He says that five days ago he reduced the hernia on right side, but since that time he has not had a stool nor has he passed any flatus; has been vomiting off and on and has suffered from severe attacks of abdominal pain. Enemata given him before admission to the hospital were of no avail. On request of Doctor Lucas, of Cavite, he was admitted here.

Physical examination.—General: Poorly nourished; mucous membranes pale; facies anxious. Heart: No murmurs heard; rapid; regular. Lungs: Ronchi and few subcrepitant râles over right chest, more marked posteriorly; respirations rapid, 30 per minute. Liver: Tympanitic over usual region of dullness. Spleen: Not enlarged. Abdomen: Moderately distended; rigid; marked tenderness all over abdomen, but more so over the right inguinal region. No evidence of a strangulated hernia on right side, no mass could be seen or felt there, but on percussion the tympanitic note over this area was not as marked as it was on the left side. Scar of former operation in left inguinal region; wound firm.

Temperature, 98; pulse, 100.

Blood: Leucocytes, 9,600.

FIG. II.—SHOWS CONTOUR OF KNEE IN FLEXION; RIGHT PATELLA (THE ONE OPERATED UPON) IS NOT SO PROMINENT AS THE LEFT.

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	Per cent.
Polymorphonuclears	66.5
Small lymphocytes	4
Large lymphocytes	6
Large mononuclears	21.5
Eosinophiles	2

Enemata given here were also unsuccessful; no feces or gas. Immediate operation advised.

Operation—Ether.—Although the cause of the obstruction was thought to be the right internal ring, still the signs of a strangulated hernia there were so slight (there being absence of a tumor and only slight diminution of tympanicity and increase of tenderness to mark this as the spot) that a mid-line incision was deemed more advisable than an inguinal.

Four-inch incision in mid line below umbilicus. Abdominal cavity opened. Omentum and small intestine were seen passing through the internal abdominal ring on right side. The intestine was not adherent to the wall of the sac, so was easily reduced, about 8 inches being involved in the coil. It was dark red in color, but circulation was readily restored on applying hot towels. A large portion of the omentum was also in the sac. This was very congested and consequently was ligated in several places and the involved area removed. The neck of the sac at the internal ring was markedly thickened, like a fibrous band, and the opening was large and patulous. As the patient's condition at this stage was very poor and it was deemed inadvisable to close the existing wound and proceed to a radical operation, the neck of the sac was sutured from within with No. 8 silk and the abdominal wound then sutured in layers and dressed.

A rectal tube was inserted high and left in place and the patient began to pass flatus through the tube shortly after operation.

Post-operative history.—April 10: Passed considerable gas and some feces. Abdomen much less distended. Temperature in p. m., 101. Some cough. Respirations, 35. Sputum, negative for bacillus tuberculosis.

April 11: No distension. Temperature in p. m., 102. Cough continues.

April 14: Abdomen flat; right chest, all signs of a lobar pneumonia from lower angle of scapular to base.

From this time on he never had any trouble with abdomen; wound healed by primary union and was firm when discharged. No appearance of any hernia on coughing. Was told to return if any mass appeared there.

His temperature continued to be around 102 in the p. m. and normal in the a. m. until May 3, from which date it ran along about normal; chest signs at this time had subsided into those of a so-called un-

	Per cent.
Polymorphonuclears	66.7
Small lymphocytes	4
Large lymphocytes	[illegible]
Large mononuclears	22.7
Eosinophiles	2

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April 14: Abdomen [illegible] from lower angle of [illegible]

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His temperature [illegible] in the a. m. until May [illegible] from which date it ran along about normal; chest signs at this time [illegible]

monary œdema and cardiac failure were overcome only by heroic stimulations and oxygen inhalations. On the twelfth day a small localized effusion was noted in the posterior part of the lung sack. On the nineteenth day, however, the temperature curve assumed a septic type, which was attributed to an empyema. It is difficult to determine just when a pleuritic effusion becomes purulent, especially when the fluid is confined mostly between the diaphragm and lung. The serous fluid might have been withdrawn as soon as detected, but the physical examination showed such a limited area involved that it seemed best to trust to absorption. As revealed later on by the operation, the prime site of the involvement was on the diaphragm and much larger than suspected. A large-size exploratory needle confirmed the diagnosis. In the purulent specimen pneumococci and staphylocci were found.

Thoracotomy was decided upon. In this case the adhesions were evidently of recent origin, consequently there was fair promise of success to obliterate the pus cavity by evacuating the fluid, breaking down these adhesions, and thus enabling the lung to expand and to fill the entire lung sack.

Under chloroform anæsthesia about 3 inches of the seventh and eighth ribs were resected; the fluid was gradually removed through a buttonhole incision into the pleura, guarding at the same time against an excessive inhalation of the anæsthetic as the lung expanded.

After removing a pint of fluid the pleural opening was enlarged, the cavity inspected, and large masses of coagulated fibrin 1 inch in thickness, covering the pleura on the diaphragm, were scooped out.

All débris was mopped out with gauze sponges; no irrigation was done at any time. The cavity, irregular in shape, was walled off by adhesions stronger than suspected, but these were broken down successfully and the lung allowed to fill the pleural cavity. Two large drainage tubes 6 inches long were inserted for two weeks without causing the patient any great inconvenience. The wound closed by granulation. To encourage expansion of the lung to its greatest capacity the boy has been rated as a bugler.

This case, then, presented in succession the features of influenza, appendicitis, inflamed gall bladder, and finally resolved itself into septic diaphragmatic pleurisy. The patient has recovered.

A CASE OF PYÆMIA FOLLOWING TONSILITIS.

By Asst. Surg. W. A. ANGWIN, U. S. Navy.

C. C. C., private, marine, Post C, Cuba, during absence of the medical officer on leave, was taken sick. This was on April 17, and as at that time he was on liberty he reported at sick quarters, Lajas,

Cuba, for treatment. The diagnosis was tonsilitis. On April 19 he returned from liberty and was placed on the sick list by the hospital apprentice on duty as with the above-named disease, registering a temperature on admission of 38.3° C.

On April 21 the patient's condition was not improved. Capt. W. H. Brooks, U. S. Army, visited him and recommended his transfer to the hospital in Cienfuegos. This was done, and a peritonsillar abscess was opened.

On May 1 orbital cellulitis developed, following exophthalmos of some days' duration, and on May 3 incision was made beneath the left eyeball for the relief of pus, if present. None was found. However, the cellulitis was relieved and improvement resulted. At the same time there was a reddened tumefaction visible on the patient's neck, left side.

On May 10, at 8.45 p. m., the patient died from septicæmia.

The following is an extract from a letter to the medical officer of this post from Maj. J. T. Clark, surgeon, U. S. Army, commanding the hospital in Cienfuegos:

May 12, 1907, * * * Private C. C. C., U. S. Marine Corps, who was admitted to the post hospital at this place on April 21, 1907, died on May 10, 1907, of septicæmia, acute. At the time of admission he was suffering with tonsilitis, acute, suppurative, bilateral. On April 23, 1907, the tonsillar abscess was evacuated, but his general condition did not improve. Two days later marked exophthalmos, left side, developed with indications of orbital abscess. Exploration was made through an incision along the lower margin of the orbit, but pus was not found. Pus did not later develop there. Multiple abscesses, however, developed and the condition was diagnosed as "Pyæmia, acute, following suppurative tonsilitis, acute, bilateral." One abscess in the right gluteal region was opened and drained. Microscopical examination showed staphylococcus infection.

A CASE OF MYOSITIS PURULENTA (?).

By Medical Inspector J. E. GARDNER, U. S. Navy.

Condition of patient for some days previous to operation as follows: Diffuse pains just below hip joint; some swelling; œdema and marked tenderness on pressure. Patient unable to flex leg on thigh. This movement appeared to be limited by extreme tension in the rectus femoris. The case appeared to be rather an obscure one, as there was a conspicuous absence of history, except exposure to cold. The septic rise of temperature, with the local conditions, suggested pus formation and the necessity of operative procedure. Operation performed by Assistant Surgeon Foster, assisted by Surg. M. F. Gates and Assistant Surgeon Reed. Ether was administered by Hospital Steward Riley. A 4-inch incision was made on the outer side of the thigh, extending downward from a point about 2 inches

below the great trochanter. Blunt dissection was made down to the bone. No bone lesion was discovered. A large cavity containing necrotic muscular tissue, shreds of connective tissue, and much dark clotted blood was found under the quadriceps extensor muscle. The cavity extended forward around the shaft of the femur to the lesser trochanter and downward to a point on the back of the thigh about 3 inches below the buttock. Here a counter opening was made for drainage. The cavity was cleaned out carefully, all pockets were broken up, and a firm packing was used to stop the rather free oozing. Rubber drainage tubes were introduced and the incision closed around them. Patient was returned to bed in good condition and discharged to duty three weeks later with the wound entirely healed and with complete use of the limb.

A CASE OF ANKYLOSTOMIASIS.

By Medical Inspector S. H. Dickson, U. S. Navy.

Private M., U. S. Marine Corps; age, 22 years; service, eighteen months. This man applied at the dispensary of the Norfolk Navy-Yard for treatment on May 17 last, complaining of general malaise and weakness. Aside from this he had no complaint to offer, his bowels being regular, his appetite good, his sleep restful. The most conspicuous feature of his case upon examination was the appearance of extreme anæmia. He seemed to be almost bloodless, though his pulse was rather full.

The patient served in Panama in the spring and summer of 1906. In July of that year he was at target practice on the range there. He says that strict orders were issued prohibiting the men from going about without shoes, but that he slept on the ground with his underclothing rolled up and his stockings rolled down. While on the range he had a skin eruption on his lower legs, but not on his feet. This eruption was obstinate and did not yield well to treatment. In August he first felt the weakness coming on him, when he sought relief and was treated for anæmia. His condition, however, became progressively worse, though his appetite continued good. From August, 1906, until he came under my observation this spring (1907) he was treated with quinine, arsenic, iron, strychnine, and other tonic drugs, but without good result, and he stated that at no time was an examination of his blood or feces made prior to his application to me.

From the appearance of the man and the history of his case a tentative diagnosis of uncinariasis was made. A blood count showed: Red cells, about 2,000,000; hæmoglobin, 50 per cent; leucocytes, about 20,000, divided as follows: eosinophiles 18 per cent, polynuclear cells

45 per cent, mononeuclears 11 per cent, lymphocytes 26 per cent. The feces were examined and hosts of full-grown worms, embryos, and ova were found. The man was put on a thymol treatment for a few days and another examination of the feces made. As this revealed still large quantities of the ova and worms, the man was transferred to the Norfolk naval hospital for treatment.

The outcome of this case is interesting in that the man is to-day apparently perfectly well, having been treated with thymol.

A CASE OF TUBERCULAR ABSCESSES OF LIVER.

By Medical Director R. C. Persons, U. S. Navy.

W. S.; seaman; age, 24 years. Admitted from naval hospital, Canacao, March 17, 1907, as with "febris continua simplex," kala-azar or acute febrile splenomegaly being suspected. Was extremely emaciated; complained of tenderness around umbilicus and below costal borders on both sides. Gave history of syphilis and exhibited scar of cholecystotomy for suspected gall bladder disease. Physical signs of heart and lungs negative. Liver and spleen much enlarged. Red blood corpuscles 3,000,000. Slight leucocytosis, relative white count normal, no plasmodium malariæ. Urine normal at first, later contained albumen in large amounts; no casts.

Temperature ran up to 103° on alternate days, and was but slightly and temporarily controlled by quinine in large doses. Had cough, scanty expectoration. Sputum contained tubercle bacilli.

Diagnosis changed to tuberculosis pneumonica chronica March 28.

Became progressively worse, fever became remittent, diarrhea and profuse sweats supervened, and death occurred April 28, 1907.

Necropsy.—Spleen and liver much enlarged. Four tubercular abscesses right lobe of liver, varying in size from one-half inch to 1½ inches.

Lungs showed no macroscopical tubercle. Pleura thickened and adherent.

A CASE OF CEREBRO-SPINAL MENINGITIS—DEATH WITHIN TWENTY-FOUR HOURS FROM THE APPEARANCE OF THE INITIAL SYMPTOMS.

By Medical Inspector S. H. Dickson, U. S. Navy.

Private S., U. S. Marine Corps; service of one month; age, 23 years. Previous history not indicative of anything special, except that he had suffered considerably from the effects of a vaccination received upon his reporting at this barracks for duty.

While on post at 4 a. m. June 19 last he had to be relieved for the purpose of going to the water-closet. He vomited freely and his

bowels moved. He then went back to his post, but when he reached the guardroom he complained of a pain in his back and slight headache, and laid down on his bed and slept for a time. At 10 a. m. word was sent to the dispensary that he was ill in the guardroom. When seen there his temperature was found to be 104.2, pulse 120, respiration 30. He was ordered to bed in the barracks where he went after walking through the yard, taking a bath, and arranging his personal belongings. After going to bed all symptoms seemed to abate and the case presented the appearance of many others with which we are constantly dealing and characteristic of no especial disease. He was given a brisk purge, directed to take no food, and at 4 p. m. his temperature had come down to 99, pulse 92, respiration 22. At 6 o'clock in the evening he was seen in bed by the officer of the day when making his round of inspection. At that time the patient said that he felt very much better, had no headache, and felt no discomfort other than the pain in his back, which was not as severe as it had been all day. At midnight (June 19) a call from the barracks brought me to his side. He was wildly delirious and required restraint to keep him from injuring himself. His axillary temperature was 104, pulse 125, pupils widely dilated. He rapidly passed into a semicomatose condition and died at 2.05 a. m. June 20.

The autopsy held at 11 o'clock a. m. the day of death established the diagnosis. At the base of the brain and in the ventricles was found a minute collection of purulent serum, microscopical examination of which showed pus cells, each one containing one or more diplococci intracellularis meningitidis. There was practically no congestion of the meninges.

The source of this infection we have been unable to determine.

A CASE OF ANEURISM OF THE AORTA (RUPTURE).

By Passed Asst. Surg. C. M. Oman, U. S. Navy.

H., J. J., boilermaker, was confined in double irons in the brig compartment of the *Ohio* at about 6.30 p. m. December 19, 1906. The crew was engaged in coaling ship, and when he asked permission to go ashore was refused. He became insolent to the executive officer, but no sign of alcohol was detected. No resistance was offered when the irons were put on and he lay down in a peaceful manner and apparently went to sleep.

About one-half hour later a fellow-prisoner noticed him "gasping for breath." He was at once removed to the sick bay. At this time no pulse was detected, respiration 10, unconscious, pupils dilated. He was pronounced dead in a few minutes. No signs or history of violence. No history of alcoholic excesses or syphilis.

He had been on the sick list nineteen days during his three and one-half years' service, but has never reported at sick call on this ship.

Autopsy.—No signs of violence, cadaveric rigidity and lividity normal; on opening the chest the pericardium was found distended and about 1 quart of dark blood and clot was removed.

An aneurism about the size of a small lemon was found, involving the aorta about 1½ inches from the body of the heart, and in the right aspect of this enlargement a small tear was present through which the blood had escaped.

Sclerotic areas were present in the first 8 inches of the aorta; the walls of the sac were infiltrated with blood and adherent to the pericardium at places. The heart was enlarged, soft, pale, and fatty. The aortic semilunar valves thickened and sclerotic; other organs negative.

CASE REPORTS FROM CANACAO HOSPITAL.

Liver abscess.

This case was admitted on January 14, 1906, with fever, leucocytosis, progressive emaciation, and tenderness over liver. The liver was apparently much enlarged. No history of dysentery was elicited and the stools were negative. At operation a large abscess was found which covered the disphragmatic surface of the liver and had dissected up the peritoneum over the posterior wall of the abdomen, extending from diaphragm to anterior superior spine of ilium, and from right abdominal wall to the left of the spine, overlapping the great vessels.

The abscess was evacuated through the transverse meso-colon and dark, thick pus obtained. Cultures and smears were negative. The cavity was found by drainage tubes to have an internal diameter of 16 inches. Convalescence was very satisfactory and the patient was discharged to duty on April 12, 1906.

This was undoubtedly an amebic abscess in which we failed to find the amebæ; this is a common experience where no autopsy is obtained.

Acute nonsuppurative interstitial Nephritis—Death.

Patient, a native seaman, was admitted on January 17, 1906, with retention of urine of four days' duration. Urine escaped in drops, but bladder distended lower abdomen and the dome reached the umbilicus. External urethrotomy was performed and patient was put on constant drainage through perineal wound. For several days after operation patient was uremic with tenderness of both kidneys; then he improved and was out of bed daily. He ran a curious temperature chart, with periods of chills and high evening temperature. The

urine gave no information. The blood showed marked secondary anemia, but was negative as to parasites. The chills later became daily and the night temperature reached 104°–106°. He died on March 23, 1906, with surgical uremia.

The autopsy showed the cause of death to be acute nonsuppurative interstitial nephritis from ascending infection. The ureters were thickened and the bladder walls were contracted and hypertrophied; they measured in thickness five-eighths inch. A pure culture of bacillus pyocyaneus was obtained from kidneys and spleen.

No accurate history of the case was obtainable, but the character of the scar tissue found at operation and the state of the bladder proved the obstruction to have been some years' standing.

Gunshot fracture of spine—Laminectomy—Death.

Admitted March 28, 1906, with gunshot fracture of spine (6th D.) and complete paraplegia. Laminectomy April 3, 1906. Processes of 6th D. vertebra inclosing canal were comminuted; canal was filled with bone fragments, which had totally crushed 5 cm. of cord. Cord was softened, much nervous tissue had been expressed through a tear in dura, and fine pieces of bone were disseminated throughout the involved area.

Patient fell to deck immediately on receipt of injury, and on admission the buttocks were severely bruised. After operation an enormous bedsore developed at this site. A cardiac murmur also first appeared at this time.

On May 25 the bedsore was filled with healthy granulations and was healing over; reflex movements had returned to both legs, and urine was passed at intervals without aid.

On May 28 there occurred a sharp rise of temperature and pulse with the appearance of hematuria. Symptoms of abdominal infection developed rapidly and patient died on May 30, 1906, fifty-eight days after operation.

Autopsy showed the immediate cause of death to be a double perinephritic abscess of U-shape, starting in the pelvis of the kidneys and extending down either side until the two collections of pus met in the pelvis.

Gall stones—Cholecystostomy.

Admitted with history of dysentery in 1904. For one year he had had attacks of abdominal cramps and pain in right chest shooting into abdomen. The history of dysentery, amoebae in stools, rapid spirations, râles and pleurisy in right base, evening temperature,

15,000 leococytosis, apparent enlargement of liver, and night sweats pointed very strongly to abscess of liver; but the intermittent character of the attacks led to delay for observation. Two days later all symptoms had subsided and the abdomen was opened. The apparent enlargement of the liver was due to adhesion of stomach and omentum to gall bladder. Viscus was opened and clear mucus escaped; 261 calculi were present. At junction of cystic and common ducts a large stone was impacted, shutting off entirely the gall bladder. The stone was crushed with the fingers and the fragments massaged into reach. Bladder drained three weeks. Operated May 10; healed and convalescent June 10.

Three cases of internal derangement of knee (Semilunar cartilages).

First case.—Admitted with fluctuating tumor of popliteal space; fluid could be pressed away with a simultaneous floating of patella. There was history of persistent disability and intermittent hydrops. A fragment of internal semilunar cartilage was detached, except at one end, turned backward on itself, and the tip was adherent to the crucial ligaments. The fragment was removed.

Second case.—History of dislocation of knee recurrent 39 times in three years. On opening the joint it seemed to be normal. On manipulation the dislocation was seen to take place and consisted of the slipping forward of the posterior segment of the external cartilage in front of the femoral condyle so that it lay anterior. Anterior segment also was loose, and the whole cartilage was excised.

Third case.—As a result of a fall there was an acute synovitis followed by persistent localized pain and stiffness. Operation showed the anterior half of the internal cartilage had been torn loose and its continued mobility produced the symptoms.

CURRENT COMMENT.

It is to be remembered that in the publication of these comments the Bureau does not necessarily undertake to indorse the opinions expressed, but will lend the pages of this section to discussion of such contemporary topics as will be of interest and value to the service.

The Brazilian ship *Barrosa*, which visited at the Jamestown Exposition for an extended period during the past summer, contributed 25 cases of beri-beri to the list of sick admitted for treatment in the U. S. Naval Hospital, Norfolk, Va. An excellent and unusual opportunity for an interesting study was thus afforded and some very suggestive facts were observed. The *Barrosa* was only one of three Brazilian ships at Norfolk, the crews of all of which were in every respect living under identical conditions, yet she was the only one to furnish cases of this disease, the outbreak being one of several such on that ship during the past three years. We anticipate the publication of an extensive report on these cases, including microscopic findings, by Surg. R. C. Holcomb, U. S. Navy, and Passed Asst. Surg. O. J. Mink, U. S. Navy, in the succeeding number of this Bulletin.

A most exhaustive, systematically arranged, and valuable report by Maj. Charles Lynch, Medical Department, U. S. Army, on "* * * the Armies in Manchuria During the Russo-Japanese War" has recently been published and issued by the War Department from the office of the Chief of Staff, Second (Military Information) Division, General Staff. It bears the serial number "8," "Reports of Military Observers Attached to * * *" the above mentioned armies and is a volume which will be a prized possession among those interested in medico-military organizations, equipments, and operations. The Bureau commends it to all medical officers of the Navy as rich in information of practical importance to them, as well as being historically educational. The text is extensively illustrated and is supplemented by tables, charts, and maps.

The laboratory of the Naval Medical School is doubtless known to the medical officers of the service as being equipped and always ready to make thorough examinations of and to furnish reports on all pathological specimens and specimens of water, etc., which may be sent to

it from shore stations and ships; but to obviate the danger of deterioration of a specimen before reaching the pathologist or chemist and to profit fully by the advantages of an expert opinion a timely report is necessary.

It should be understood, therefore, that medical officers of the service may forward specimens, together with explanatory notes, direct to the laboratory in order that there may be no delay in supplying the information sought.

MEDICAL DEPARTMENT BATTLE STATIONS.

By Surg. W. H. Bell, U. S. Navy.

In a recent communication Surg. F. M. Furlong, U. S. Navy, suggests a skeleton plan for dressing and relief stations on battleships of the *Vermont* type. In handling the problem he has given due consideration to features of construction as effecting protection and transportation on the one hand and the permanent numerical force of the surgeons division and its possible emergency augmentation by assignments from the other noncombatant personnel on the other hand.

He locates three dressing stations, one primary and two secondary, placing the former on the port side of the berth deck just abaft the forward armored bulkhead, and the latter on the port and starboard sides of the berth deck just forward of the after armored bulkhead. These may be reached from the gun positions through the several hatches and along the fore and aft berth deck passageways, using those on the unengaged side if necessary. Relief stations are located with reference to exposed gun crews and the liklihood of greatest need for first-aid relief, especially those extreme forward and after parts of the ship isolated from the dressing stations. In some cases these would have to be temporary and shifted from place to place, as the movements of the ship and other circumstances compelled.

Theoretically speaking, it would be better if the principal dressing station could be located more centrally and below the water line, and the secondary stations located one aft, as the plan suggests, and one forward in the place of the proposed principal station. This distribution would meet the dressing station demands of two widely separated parts of the ship and bring the principal station in relation to both secondary stations.

It is to be remembered in establishing medical department battle stations that each type presents distinct requirements:

1. Primary stations exact protection as the foremost desideratum, with accessibility second only.

2. Secondary stations exact that equal weight be given the requirements protection and accessibility.

3. Relief stations exact accessibility as the foremost desideratum, with protection second only.

VENEREAL PROPHYLAXIS.

By Asst. Surg. G. L. Wickes, U. S. Navy.

The number of men affected by venereal disease on the U. S. S. *Wilmington* prior to the adoption of stringent compulsory prophylactic measures was appalling, and the resulting complications, such as inguinal adenitis, epididymitis, etc., made serious inroads upon the efficiency of the ship's enlisted force.

During the several months that this ship was lying at Canton, China, an optional system of prophylactic venereal treatment was instituted, but proved entirely unsuccessful, owing to the surprising lack of interest and irresponsibility of the members of the crew. Thirty cases of syphilis primitiva alone were contracted during the five months that were spent at that port. This ship's predecessor at Canton was equally unfortunate in regard to infection by venereal disease. Prophylactic measures on that vessel also consisted of optional treatment and the recommendation of special precautions, but as the advice was undoubtedly disregarded, no apparent benefit resulted.

Upon the return of this ship to the Philippines the optional measures were considered sufficient, owing to the well-organized system of venereal quarantine which is practiced in Manila and Cavite; but on December 18, 1906, the *Wilmington* being then en route to Hongkong, China, a letter was submitted to the commanding officer, whose approval of the recommendations contained therein resulted in the adoption of the compulsory system of prophylaxis against venereal disease, hereafter described.

SYSTEM INAUGURATED.

A copy of the liberty list is furnished to the sick bay and all men returning from liberty are sent there, either to receive treatment or to be immediately dismissed, according to their statements. Whichever is done is noted on the liberty lists which are saved for future reference. Men who are found later to have practiced deception in their statements may thus be detected and reported for such punishment as the commanding officer cares to inflict.

Men who admit having incurred risk of infection receive the following routine treatment:

1. The penis is thoroughly washed with green soap and water.

2. The penis is then washed with a solution of bichloride of mercury of the strength of 1 part to 2,000 of water.

3. An anterior urethral injection of protargol of 2 per cent strength is given and retained for not less than five minutes.

4. The penis is then rubbed well with a 50 per cent mixture of calomel powder and lanolin, particular attention being paid to the region of the frænum. This mixture is allowed to remain on the penis all day. The clothing is protected by a suitable dressing. The above treatment is administered under the direction of a hospital corpsman. The men receiving treatment do not come in contact in any way with the medical officer.

I am of the opinion that the success of these measures or any similar ones depends entirely upon the manner in which they are carried out. To be successful it must be compulsory. Each man returning from liberty should be interviewed. Also, all features which might embarrass the man should be obviated as much as possible, so that his confidence may be secured and there will be less occasion for him to make false or misleading statements when he is questioned. For this reason the medical officer has no official connection with this duty beyond the care and preservation of the liberty lists. The success of such measures depends upon the approval of the commanding officer and the full accordance of the officer of the deck with the working plan.

Subsequent to the introduction of this method of prophylaxis there were 922 liberties made in Chinese ports; of this number 426 received treatment. The negative statements of the other men were accepted as made. Thus far it has not been necessary to place any man on report for deception and false statement.

It is sufficiently indicative of the effectiveness of the system that *no case of syphilis primitiva* developed aboard this ship in the first five months of the year, which period represents our experience in its operation to date of present writing. The major part of this time was spent in Chinese ports of hitherto unsavory, venereal reputations. Fourteen cases of gonorrhœa developed, but 8 of these cases were contracted in the Philippine Islands, where prophylactic measures were not enforced. It is but fair to state, moreover, that the majority of the cases of Chinese origin either developed before the men returned to the ship or among those men who were breaking their liberty. It was also noted that venereal disease occurring among men who had taken prophylactic treatment ran a much milder and shorter course, it is believed, in consequence; the disease responded to treatment more readily, and complications were unusually rare. During the five months indicated there was not one case of ulcerative chancroid and but one case each of epididymitis and inguinal adenitis. The latter case did not require operative interference. At Canton,

China, for a similar period of five months, 25 complete excisions of inguinal glands were necessary.

At the present time, I believe that compulsory prophylaxis should be made routine on every ship of our Navy at every port visited, in the interest of the service's welfare and efficiency, if not for humanitarian reasons. It is apparently far safer to trust to these measures than to the best systems of shore quarantine, though enlightenment in sexual hygiene and moral guidance must not be neglected in our campaign against the destructive diseases embraced under the class venereal.

MEDICAL PROGRESS.

SURGERY.

By Surg. H. C. CURL and Asst. Surg. H. W. SMITH, U. S. Navy.

DRAINAGE IN APPENDICITIS.

There has, perhaps, been a too complete reaction from the days when every abdominal operation (wound) was treated by large masses of packing, slowly removed and followed by large scars, liable to become the site of hernia.

Some recent teachings go so far as to advise complete closure in almost all cases, even if pus and necrotic areas are present.

Against this "extreme view" Dr. L. A. Stimson, of New York, speaks very definitely in a clearly expressed article in the July Annals of Surgery.

He makes small incisions, handles the intestines as little as possible, mops out pus, does not consider the removal of the stump of an appendix as absolutely essential, if by doing so you must endanger the patient.

He does believe in drainage and says, "I would not willingly forego the feeling of safety which it gives, and what weighs upon me is the uncertainty lest there may be some (cases) among them in which its absence [i. e., drainage] will mean an added danger, another operation, or even death."

He does not advocate it in all cases, but says: "Its disadvantages are not more, I think, than trifling inconveniences—a brief delay in the final cicatrization of the wound and a momentary pain in the withdrawal." "Surely nothing is lost by providing an escape for the exudate and reducing the task of the body to taking care of the bacilli and the toxins which it contains."

In conclusion he says: "Let us reserve our ideally complete operations for the young, the strong, for those appendices whose potentiality for harm has as yet been only slightly manifested."

SUTURE OF BLOOD VESSELS.

The importance of arterial suture, both following injury and as a plastic operation, deliberately undertaken, is more and more becoming manifest.

At present the greatest variations occur in the reported results, this (probably) being due almost entirely to technic and classes of cases chosen. Many men, successful in other lines of surgery, have had most discouraging results, frequent leaking, thrombi, etc., with gangrene and other unpleasant sequelæ. Others, among whom Doctor Crile is prominent, report wonderful results.

All agree that *absolute* asepsis (not the "relative" asepsis of ordinary surgery) is necessary, and that very close attention to detail must be observed.

The needles used are the so-called "bead needles;" and the silk, small as it is, should entirely fill the holes made by the needle in the vessel wall. Vaseline is used to coat the needles and the silk, in order to lessen the tendency to clot formation. Of the different methods of anastomosing a completely severed vessel, the plain end-to-end suture is considered the best. Some form of clamp is applied firmly enough to cut off circulation, but not with force sufficient to injure the vessel wall. The end of the vessel is cleanly cut with a very sharp knife and (three or) four stay sutures are placed. The sutures go through all the coats, and great care is to be used in approximating the edges accurately. In larger vessels, where a sheath is present, this is used to provide an additional protection.

The invagination method and the suture by mechanical aid are not considered as good as the above method.

As a necessary result of this blood-vessel work, the study of coagulation has been followed very closely, as the bad results more often follow thrombus formation than leakage. The careful handling of the vessel, avoiding any pressure severe enough to compress the walls materially, the use of very small needles and silk dipped in vaseline, seem to be essential to success.

As Dr. J. E. Sweet says, "Those who report uniformly successful results have succeeded not because they enjoy a monopoly of *aseptic technique*, but of *mechanical technique*." It is, after principles are learned, all a matter of the "finger tips," and work on animals is very valuable.

Doctor Crile has recently submitted reports of a very "radical" sort, the amputation of a part of an animal's leg, its preservation on ice for some hours or even days, and its functional restoration (partial at least) by blood-vessel suture and carefully apposing other tissues.

In those cases where the vessel eventually is closed by a clot, if this result can be delayed even a few days, gangrene is not as likely to follow as in those cases where the circulation is cut off at once.

The applications of this class of suture are manifestly numerous.

STATISTICS RE CARCINOMA.

The July number of the Annals of Surgery is devoted almost entirely to a review of the end results and recurrences in cases operated upon for carcinoma.

The reports from different well-known surgeons vary greatly as to percentage of recurrences. These figures, mostly dealing with operations for carcinoma of the breast, vary between 20 and 55 per cent of permanent cures.

This variation is due to the different classes of cases considered as "operable" by the different operators, and is summed up by Doctor Halsted as follows: "The most conscientious man may refuse to operate upon any but favorable cases, and, by performing an incomplete operation exclude from his list of complete operations such bad ones as he finds himself operating upon."

All agree that if you are to operate at all, *operate early and thoroughly.*

TYPHOID PERFORATION.

Dr. C. D. Selby, in the Journal of American Medical Association for June 22, very clearly sums up the diagnostic points in perforation from typhoid ulcer.

He considers three symptoms as being of special value. They are (1) suddenly appearing abdominal pain, (2) rigidity of the muscle wall, and (3) tenderness on pressure.

The increase in pulse rate, the anxious countenance, the signs of shock, the temperature, and the blood count all are significant, but of less value.

In diagnosing perforation Doctor Selby urges the use of the "group of symptoms" rather than any one alone.

As practically 100 per cent of these cases die without operation, early operation is strongly indicated.

"THE PREAPPENDICITIS STATE."

Dr. J. G. Sheldon, in the Medical Record of May 4, calls attention to what he calls the "preappendicitis state," and shows the need of recognizing it in order that operation may be done before serious changes take place.

He sums up the symptoms as follows: "Intermittent, diffuse, but slight, abdominal pain; moderate constipation (in most); abdominal distention in a few; and slight, but not constant, tenderness over the appendix on deep pressure." He considers that a history of attacks presenting these symptoms justifies operation.

TREATMENT OF DELAYED UNION OF FRACTURES.

Schmieden, Bier's successor at Bonn, reports a number of cases of pseudarthrosis treated by Bier's method of blood injections.

It has been noted that extravasation of blood at the site of fracture provokes symptoms of a mild acute inflammation, succeeded by the production of a hard connective tissue, into which bone eventually penetrates in the usual fashion, and that in a general way the size of the callus varies with the amount of extravasation. Bier believes that extravasation of blood is the natural irritant which excites callus formation, and the method is indicated in those cases in which for any reason the system has lost its ability to produce callus. Non-union due to extreme malposition obviously is not included among the suitable cases.

Technique.—With a very strong syringe having a large caliber needle, 30–40 cu. cm. of blood are withdrawn from a vein and immediately injected into the space between the fragments. Defibrinated blood is less effective, and the reaction is stronger to blood from another individual, although the patient's own blood may be used. Quickness is required in the manipulations to avoid coagulation in the syringe. Injections are given about once in ten days, and have to be repeated two to six times. The usual treatment is followed coincidently.

The results reported are good, and such a simple treatment, especially since it is not inconsistent with conservative methods, seems well worth a trial before resorting to an open operation.

TREATMENT OF INFECTED WOUNDS.

The treatment of infected wounds of the hands and feet is of special interest to naval surgeons, because of the number of cases treated by them. Treatment in these cases is at best unsatisfactory, and many an apparently slight infection leaves extensive "welding" tendons and permanent disability.

Any improvement in our method of handling such cases is to be welcomed.

In a recent article Dr. E. A. Codman, of Boston, reports his experience with the Bier congestion method, and is quite enthusiastic in his statements regarding it. The treatment consists in the use of a rubber strap, 2 inches wide, applied to leg or arm with just sufficient force to cause congestion, redness, and warmth, but not enough to stop the pulse or cause blueness and cold. The part is covered by a moist bichloride dressing and the treatment continued for an hour (or perhaps less). Examinations are made frequently to see that the congestion is satisfactory and that the pulse is not stopped.

After the constriction is removed a moist dressing and splint are put on and treatment repeated the following day. Primary opening of the infected area is recommended, but an extensive dissection is considered undesirable.

Quicker recovery and much less permanent damage result from this than other methods of treatment, and this result is perhaps attained, as suggested by Doctor Smith in the July Bulletin, by an auto-absorption or vaccination comparable to the artificial one used in the "Opsonic treatment." The constant presence of a negative phase following the treatment is at least very suggestive.

PATHOLOGY AND BACTERIOLOGY.

By Passed Asst. Surgs. C. S. Butler and O. J. Mink, U. S. Navy.

DETECTION OF SYPHILITIC ANTIBODIES.

Paul Fleischmann and W. J. Butler, Journal American Medical Association for September 14, 1907, describe the method developed by Wasserman for the demonstration of antibodies in the body fluids of syphilitics. As the result of their work they are convinced that it is possible to determine with almost positive certainty in a large number of cases the existence of syphilis in an individual regardless of the length of time he has had it, and to judge in some degree, the efficacy of previous treatment and the prognosis.

The writers refer to the development of specific lytic power in the blood serum of one animal b, when the red blood corpuscles of another animal a, are introduced into its circulation. This lytic power is dependent upon "complement" present in all serum and capable of inactivation at 132° F., and immune body, present in the immunized animal and stable at 132° F. The immune body or hemolytic amboceptor has affinity on the one hand for the blood corpuscles of the animal b from which they were taken and after this affinity is satisfied for complement. These three substances comprise an hemolytic system and their combination leads to the "laking" or rendering transparent of an opaque suspension of blood corpuscles. An inactivated hemolytic serum will, of course, not manifest any lytic effect until complement is added, which may be done by adding the fresh serum of any other animal.

Parallel with the production of an hemolytic amboceptor by the injection of blood corpuscles is the injection of bacteria or albuminoid substances which produce amboceptors in the injected animal, which have affinity for the specific bacteria (or albuminoid substances) used, on the one hand, and, on the other hand, for the complement.

Boudet and Gengou used this principle to determine the nature of an infection, by mixing the inactivated serum of infected animals with the supposed causal bacteria, and adding complement. In case the immune body was present in the animal's serum, a union of these with the bacteria and complement took place, the complement was fixed. If to this mixture after some time blood corpuscles plus inactivated specific hemolytic serum is added, hemolysis can not take place on account of the lack of complement. In case, however, the serum under examination did not contain the specific antibodies, complement would not be fixed and laking would occur.

The method therefore permits of demonstrating antibodies as well as the substances which cause them.

For carrying out the test in case of suspected syphilitics (paretics, tabetics, etc.), five substances are required and it is necessary that the action of each of these substances be interpreted by the action of its control. The substances are:

1. As antigen (i. e., any substance capable of producing antibodies when injected): Extract of liver or spleen of a syphilitic newborn, and as control extracts of other organs.

2. As antibodies: The serum or spinal fluid of the suspected syphilitic person, and as control the serum of nonsyphilitic.

3. As complement: Guinea pig serum (or any other fresh normal serum).

4. As hemolytic inactivated serum: Preferably the serum of a rabbit previously treated with washed lamb's blood corpuscles.

5. A 5 per cent suspension of washed defibrinated lamb's blood corpuscles.

The result of the reaction is determined after the reagents have been two hours in the incubator and twenty-four hours on ice.

The writers describe the method of making the several substances required, and they also detail numerous cases showing the reaction.

IODINE REACTION IN THE LEUCOCYTES ("IODOPHILIA").

J. Barnicot, Journal of Pathology and Bacteriology.—Ehrlich in 1883 recorded the presence of granules which stain brown with iodine in the leucocytes of pus. Numerous observers have since made extensive observations and seem to have established the diagnostic value of the phenomenon.

Technique.—The air-dried blood film is mounted in—

Iodin	1
Potass. iodid	3
Aq. dest	100

Gum acacia sufficient to make a thin sirup.

The reaction consists in the presence of small, amorphous fragments or granules of varying size lying both inside the polymor-

phonuclear leucocytes and free in the plasma and stained a mahogany brown. The erythrocytes and negative cells are colored a bright yellow. The brown staining is probably due to the presence of combined glycogen in the cell, and certain staining methods show that it exists in normal blood. The relation of the glycogen reaction to the normal or pathological metabolism of the cell is not known; it is probably an expression of degenerative processes.

The conclusions drawn by Locke and Cabot (800 cases, Massachusetts General Hospital) and by Barnicot (200 cases) may be summarized as follows:

The reaction bears no constant relation to leucocytosis.

A positive reaction indicates a general toxemia of considerable degree.

It is almost invariably present in pyogenic infections, bacterial toxæmias, and nonbacterial toxæmias such as uræmia, grave anæmia, unresolved pneumonia, etc. It is lacking in pleurisy, rheumatism, alcoholism, freely draining abscesses, early malignant disease, nervous conditions, and uncomplicated tuberculosis.

The reaction is so inconstant in its manifestation or so variable in degree that it is not generally valuable as a diagnostic procedure, but it may be of great assistance in differentiating such affections as tuberculosis (neg.) and unresolved pneumonia (pos.); epilepsy (neg.), alcoholism (neg.), and uræmia (pos.); pleurisy (neg.) and empyema (pos.), and intraperitoneal hemorrhage (neg.) and infection (pos.). In general no septic condition of any severity can be present without a positive reaction.

A NEW METHOD FOR BLOOD CULTURES.

In the September number of the American Journal of Medical Sciences, Epstein describes a method of making blood cultures in special cases of infectious diseases by means of ammonium oxalate solution.

The solution employed consists of ammonium oxalate, 2 grams; sodium chloride, 6 grams, and distilled water, 1,000 c. c. Measure accurately into large test tubes in quantities of 10 c. c. each and sterilize on three successive days for twenty minutes. This solution, which is ipsotonic with the blood, should be made up fresh about every three weeks.

Steps in making cultures.—About 10 c. of blood is withdrawn from a vein and introduced into 10 c. c. of the oxalate solution. This is thoroughly shaken.

The mixture may now be taken to the laboratory and studied by any or all the methods indicated for blood-culture work.

The advantages claimed for this method are:

1. It reduces the preparation and work at the bedside to a minimum.

2. It prevents the bactericidal action of the serum due to coagulability of the blood.

3. It facilitates more extended study of the blood than is possible with our present methods.

4. The oxalated blood may be sedimented, smears made and examined for bacteria, and the supernatent fluid obtained by centrifugation may be used to determine the opsonic index.

In his positive cases (pneumococcus, streptococcus, staphyllococcus, typhoid bacillus, and bacterium coli), the phenomena exhibited by the organisms when the oxalate method was used were the same as in the controls.

SPIROCHETES IN HODGKIN'S DISEASE.

Dr. W. C. White, in the Journal of the American Medical Association of August 31, 1907, reports the finding of spirochetes in the enlarged lymphatic glands in a case of Hodgkin's disease. He found that the organism stained easily with silver nitrate, iron-hæmatoxylin, and Geimsa's stain. The spirochetes were in the blood vessels among the cells and at times within the cells.

Doctor White mentions three possibilities to explain his findings: (1) The spirochetes were the etiological factor in the enlargement of these Hodgkin's glands; (2) The glands were infected secondarily with Spirocheta pallida; (3) Hodgkin's disease may be a mild form of lues, as tuberculous glands are a mild form of tuberculosis.

STAIN OF SPIROCHETES IN TISSUE.

In the Journal of the American Medical Association of February 16, 1907, Uhle and Mackinney describe the Levaditi method of staining Spirocheta pallida in tissue. The method is as follows: Small pieces of tissue about 2 mm. in thickness are hardened in 10 per cent formalin for twenty-four hours and then alcohol for the same period, and subsequently washed in water for a short period. They are stained in a freshly made solution of silver nitrate of 1.5 per cent for three successive days, changing the solutions each day, maintaining a blood temperature, and excluding light. The tissue is then placed in a 2 per cent solution of pyrogallic acid, with the addition of 5 per cent formalin. After remaining in this for twenty-four hours, light being excluded, they are passed through 85 per cent, 95 per cent, and absolute alcohol, respectively, embedded in paraffin, and cut about five microns.

This method gives excellent results, the spirochetes staining black and the tissues light brown.

Equally good results may be obtained by allowing the silver nitrate to act at room temperature and embedding in celloidin.

PARISITOLOGY.

By Surg. H. C. Holcomb, U. S. Navy.

THE BEDBUG AS THE INTERMEDIARY HOST OF LEISHMAN-DONOVAN BODY OF KALA AZAR.

The recent work of Capt. W. S. Patton, I. M. S., in relation to the bedbug as the intermediary host of the Leishman-Donovan body is of considerable interest. The result of his work is published in the Scientific Memoirs of the Medical and Sanitary Department of the Government of India.

THE OCCURRENCE OF THE LEISHMAN-DONOVAN BODY.

The Leishman-Donovan body was formerly reported as found mainly in the spleen, liver, and bone marrow. It has, however, been found also in the lymphatic glands, suprarenal capsules, testes, pleuritic exudates, and circulating blood.

Bodies similar to the Leishman-Donovan body were found by Cunningham, and later by Firth, in the small-celled exudate constituting the base of oriental sore, and still later it was further shown to be present in tropical pemphigus contagiosus.

THE LEISHMAN-DONOVAN BODY CAN BE FOUND IN THE PERIPHERAL CIRCULATION.

In a case under observation by Manson and Low they were unable to find the parasites in the peripheral circulation. Finding the parasites in the liver as well as the spleen, it was suggested that possibly the Leishman-Donovan body might escape by the biliary secretion in the feces.

Manson suggested that the parasite leaves the body in discharges of ulcerated surface, intestinal or cutaneous, and is ingested by some foul-feeding fly in which it undergoes multiplication and is then transplanted into the human host by the insect by bite or contact with broken skin surface.

The work of later observers has cast doubt upon the feces as the means by which the intermediary host becomes infected, owing to the action of intestinal bacteria upon the Leishman-Donovan body.

The experience at the general hospital at Madras, according to Patton, has shown that in most instances the parasite can be found in the peripheral circulation. In 38 out of 45 cases it was present in the peripheral blood. In one instance, however, 11 films were examined before the parasite was found. But in cases where the parasite was found to be present in the blood it sometimes occurred abundantly, there being as many as 128 parasites found in one of Patton's films.

THE BLOOD-SUCKING INSECTS IN MADRAS.

Captain Patton states that among the blood-sucking insects in Madras that might be concerned in the carrying of the Leishman-Donovan body are the body louse, mosquito, house flea, bedbug, and human tick. All these insects, with the exception of the house flea, he used in his experiments.

Pediculus capitis.—From a case dead of *kala azar* transferred 50 to head of another case; dissected 8 and found 1 free unchanged parasite. Later used 32 lice in a second experiment, which were negative; dissected in all 102 lice, of which all but one were negative.

Pediculus corporis.—Dissected 15 lice; found no parasite in insects kept two or three days after biting infected persons.

Culex fatigans.—One hundred and fifty-seven female mosquitoes fed on the blood of a case of *kala azar* and, subsequently dissected, failed to show Leishman-Donovan bodies in midgut.

Ornithodoros savegni (human tick).—Eleven were allowed to feed upon a case of *kala azar* and subsequent dissection failed to reveal presence of Leishman-Donovan bodies.

Anopheles stephensi.—Forty females were fed upon different cases of *kala azar* and examined, but found negative to the Leishman-Donovan body.

Stegomyia fasgens.—Twenty-one were fed several times but negative to the Leishman-Donovan body.

Cimex macrocephalus.—Eleven fed; one dissected after three feedings and found pyriform-shaped flagellum (structure hard to make out). Later 41 bugs were dissected from unsuitable cases and found negative.

Later six bugs were removed from the bed of a European dead of *kala azar.* A bug dissected after one day showed a large mononuclear with three parasites. From the appearance of the midgut contents feeding probably took place about forty hours previous. Another bug dissected the same day showed a free parasite. Remaining four, negative.

Later a few bugs were fed. One parasite found in a polymorphonuclear four hours after feeding. Of 22 bugs fed May 16, dissected 1 a few days later and found 2 free parasites. One dissected several days later, having been fed again in the meantime, showed 15 free parasites. Four days later another female dissected showed a parasite. June 4, fed remaining bugs again; 4 bugs dissected and negative. June 5, 1 dissected and found 11 parasites. Remaining dissected June 5 and 6, and found negative.

Two cases then cited in which a number of bugs were allowed to feed but once. All negative.

Several bugs were then obtained from the bed of a case of *kala azar*. One dissected showed three parasites; remaining, negative, One to six bugs fed on this case. Case died on 13th. Bugs fed on young monkey daily until 17th, when all were dissected; all negative.

Captain Patton in closing his important communication draws four conclusions, which follow with his appended note.

CONCLUSIONS.

First. The Leishman-Donovan body occurs frequently in peripheral circulation in cases of *Kala azar* in Madras, the parasites being seen in the leucocytes, but never in the red cells or free in the plasma.

Second. In certain cases, with extensive ulceration of the large intestine, there occurs an increase of the polymorphonuclear leucocytes, and many of these cells contain parasites.

Third. Though the Leishman-Donovan body has been recovered from the midguts of lice (*Pediculus capitis*) it was never found in *Pediculus corporis*, *Culex fatigans*, *Anopheles stephensi*, *Stegomyia sugens*, or the tick (*Ornithodoros savegni*).

Fourth. The parasite can be found in the midguts of bugs (*Cimex macrocephalus*) fed on cases of *Kala azar*, and kept at room temperature, and these parasites have in a few cases showed considerable development.

NOTE.—Since writing the above I have found in the bedbug (*Cimex macrocephalus*) all the intermediate stages of development and numerous fully developed flagallates similar to those seen in splenic blood.

IS THE DISTINCTION BETWEEN ENTAMOEBA COLI AND ENTAMOEBA DYSENTERIÆ VALID?

Under the above title, Vedder (The Journal of Tropical Medicine and Hygiene for June 1, 1907) takes issue with conclusions drawn by Musgrave and Clegg in their article, "The Cultivation and Pathogenesis of Amoeba" in the Philippine Journal of Science.

The author, quoting from the article referred to above by Musgrave and Clegg, who question the justification of establishing the two species *E. coli* and *E. histolytica*, takes up the points of difference in these two species of intestinal amoeba as studied by himself, Schaudinn, and Craig.

The points of difference as emphasized by him are given in the following table, prepared from the article:

	Entamoeba coli.	*Entamoeba histolytica.*
Motility.....	By comparison in same stool the *E. histolytica* is more active.	By comparison in same stool the *E. coli* is more sluggish.
Endosarc and ectosarc.	Both the endosarc and ectosarc is less coarse than in the *E. histolytica.*	Both endosarc and ectosarc is more granular and coarser than *E. coli.*
Blood cells within structure.	No blood cells have been noted within the structure of this species.	Red blood cells are found in this species, showing its partiality to these organic elements.
Nucleus.....	The picture is almost the complete opposite of the *E. histolytica.*	The nucleus is always eccentric, the shape round, of small size or not visible, the chromatin small in amount, and the nuclear membrane d stinct.
The life cycle.....	Reproduction by (*a*) simple fission; (*b*) by encystment with the formation of eight small amoeba. In the encysted form the parasites gain entrance to intestine protected against action of gastric juices; the adult forms are unable to infect.	Reproduction by (*a*) simple fission; (*b*) by sporulation, a process totally different from encystment, which, apparently, does not occur in *E. histolytica.*
Pathogenicity	Found frequently in healthy individuals through long periods without symptoms.	Schaudinn and Craig claim that these spores are capable of causing intestinal symptoms and lesions. The spores of this species have been shown by Schaudinn to cause intestinal lesions.

Musgrave and Clegg prefer and believe that as a result of their investigations they are fully justified in retaining the name *Amoeba coli* (Loesch) to represent those amoebæ that are found in the human beings. Vedder discusses the work of these authors, of the late Fritz Schaudin, and of Craig, and points out what he believes to be certain fallacies in the conclusions of Musgrave and Clegg. These fallacies as stated by him are: (1) The study of the morphology of amoebæ in cultures and comparing these results with the results of the studies of morphology in the stools; (2) the comparison of the morphology of encysted amoeba with adult forms; (3) the study of morphology from sections of lesions.

GENERAL MEDICINE.

By Surg. R. M. Kennedy, U. S. Navy.

RADIUM THERAPY.

Truman Abbe, M. D., of Washington, D. C., July, 1907, summarizes the effect of radium treatment as follows:

(1) Though very much like the X rays, the radium rays are different and will cure some cases which resist the X rays.

(2) Radium is applicable in cavities and some deep tissues which are not accessible to the X rays.

(3) Radium has a marked analgesic action in many nerve pains, some acute inflammations, and most cancers.

(4) Radium has been used successfully in the treatment of warts,

pigmented moles, vascular nevi, urethral caruncle, some cases of psoriasis, acne, and keloid; in the stenoses of esophagus and rectum from malignant disease; in 80 per cent of the cases of lupus, all the other 20 per cent being improved; in 66 per cent of the cases of malignant growths of the skin, and with improvement in an additional 20 per cent; in many tangible cancers with improvement; in exophthalmic goiter, with cures in 33 per cent and improvement in an additional 44 per cent of the cases.

RECENT ADVANCES IN OUR KNOWLEDGE OF SYPHILIS.

The New York Medical Record refers briefly to the many discoveries which have been made in the last few years and which have greatly modified our conception of this disease.

(1) The germ of syphilis, the spirachæta pallida, identified a few years ago by Schaudin and Hoffmann as a very thin filiform protozoan, can usually be found without difficulty in the primary and secondary stages of the disease, and its occurrence in the tertiary stage has been recently found. Mantrelepont, of Bonn, has found the protozoa in small numbers in four cases of tertiary syphilis. It also has been found both in the child after birth and in the fetus, in almost every organ, though chiefly in the liver, stomach, and intestines.

(2) According to Ehrmann, of Vienna, the germs spread from the focus of infection along and even through the nerves. This is an important discovery, which appears to confirm the current attribution of certain serious nervous diseases to antecedent syphilis, and as it is reasonably certain that the spirachete, like typhoid and many other bacilli, may remain in the organism for years in a latent state, we find here strong support for the view that tabes, at least in some of its forms, is a product of the syphilitic virus.

(3) "Next in importance to the discovery of the germ is that of the communicability of syphilis to monkeys. Neisser in particular has experimented on a large scale in Java and produced symptoms very similar to those of human syphilis in all species of monkeys and apes, the closest approximation to the human disease occurring in the highest species. Last year (1906) Neisser and others finally succeeded in inoculating monkeys with tertiary syphilis. Recent tertiary growths, in which suppuration had not occurred, whether appearing late or soon after the primary infection, produced typical primary syphilis in monkeys to which they were transplanted. The inoculation was not always successful, doubtless owing to the relatively sparse occurrence of the spirochete in tertiary syphilis."

(4) "In the light of these experiments every person showing even tertiary symptoms must be regarded as a possible source of infection.

The primary and secondary products, however, are particularly dangerous, because they contain greater numbers of germs, occur on the genitals and mucous membranes of the mouth, and often present a harmless appearance. Inherited syphilis can also be transmitted by inoculation and the nasal mucus of syphilitic children is particularly virulent. Hoffmann has also apparently proved, in contradiction to current opinion, that the blood of recently infected patients is a source of contagion. From all this follows the extremely important conclusion that syphilis is contagious in every stage and type, and that every organ of a syphilitic person may harbor the germs of the disease."

(5) It was formerly believed that a person who has once had syphilis is henceforth immune to the disease, and that this immunity is shared by children of syphilitics, even if they have not inherited the disease, but this last assumption has long been disproved by the frequent occurrence of syphilis, acquired by contagion, in children of syphilitics. The supposed impossibility of a second infection has also proved illusory in numerous cases, although repeated infection is still regarded as exceptional. Recently, however, so many cases have been reported by competent observers that we can no longer speak of permanent immunity produced by a first infection.

(6) "Although these discoveries have thrown much light on the origin and nature of syphilis, they have suggested little in regard to treatment, except to indorse most emphatically the classical method. Mercury still remains the sovereign remedy for syphilis. Every attempted serum treatment has failed. Mercury alone is able to influence the disease at every stage, probably by paralyzing the spirochete. But it must be remembered that the administration of mercury simultaneously with the introduction of the germ does not prevent the outbreak of primary syphilis, although recent experiments would seem to show that the hope is not without foundation that an effective serum will yet be discovered, and that the cure of syphilis, as of other diseases, will ultimately result from the discovery of its germ."

OTHER SOURCES OF THE DANGERS ATTRIBUTED TO WOOD ALCOHOL.

The modern materia medica of the Druggists' Circular refers to a possible danger attending the use of formaldehyde or its compounds, members of the methylene group, and formates, as remedial agents.

If, as suggested, the deadly and sight-destroying power of wood alcohol is due to its decomposition product, formic acid, should not the greatest caution be exercised when employing remedial agents as formaldehyde or its many compounds, members of the methylene group, and the formates? It is believed that wood alcohol (or methyl

oxide, more commonly known as methyl alcohol) is converted first by oxidation into formic aldehyde (oxymethylene), and this compound by still further oxidation becomes formic acid. If this be so, may not formaldehyde, or its numberless compounds which have been brought forward for medicinal use and which are supposed to depend for what action they may have on the liberation of formaldehyde in the system, be expected to yield the same destructive acid, it being an intermediate product in the change of wood alcohol into formic acid?

From the foregoing it would appear that the proposed medicinal use of formaldehyde in any form opens an extremely grave question, namely, the possibility of the destruction of sight, and this thought should at least cause the utmost care in the medicinal administration of anything which may yield the same result or even the slightest impairment of vision. Slight changes of vision, if resulting from such medication, might easily be overlooked or ascribed to some other cause.

It would appear, then, that due care and careful observation should be exercised in the employment of members of the methylene group and the formates from which formic acid might easily be set free. Applications, it must be remembered, will introduce a medicament into the system as well as the usual internal administration.

REPORTS AND LETTERS.

ASSOCIATION OF AMERICAN MEDICAL COLLEGES.

Medical Director J. C. Wise, U. S. Navy, who represented the Medical Corps of the Navy at the meeting of this association which convened in Washington May 5, 1907, calls attention to the following points of interest in its deliberations and the papers read:

"The subject 'giving credit for work done in literary colleges' was treated in a careful and scientific manner, and its consideration was useful in preparing the minds of its hearers for an important amendment to the laws of the association in relation thereto.

"Professor Guthrie, dean of the medical department of the University of Iowa, proposed an amendment to strike out of the constitution everything having reference to a time credit for the baccalaureate degree. This proposed change would make it obligatory that each student spend four years in a medical college and that no credit be allowed for anything except for time actually spent in a medical college, although giving credit for work on subjects is not prohibited. It seems that this idea is not only approved by the State board of examiners, but is provided for by statute in many of the States.

"The discussion of this amendment was very full, and was an ample exposition of the tendencies of medical teaching in the United States. The business of teaching embryology, biology, bacteriology, and allied subjects in art schools and having it count as part of the term required for graduation in medicine is extensive, and representatives of these schools were present to see that such business was not taken from them, on the ground that the question before the State board was not *where a man got his knowledge*, but, rather, *whether or not his knowledge was sufficient.* The advocates of the amendment, while appreciating the great value of collateral learning, contended that every day of the four years must be spent in a medical school; that the length of the course of four years in modern medicine was all too short, and that none of it could be taken up by outside teaching. This latter view prevailed and the Guthrie amendment was adopted, and it marked a distinct advance, in the progress of medical teaching and requirement, toward an ultimate

solution of the evil of granting diplomas to men of inadequate acquirements—a condition appallingly common. The representative of the Navy advocated the view which will surely prevail at some future time—to deny, by statute, the right to grant diplomas to any other than the endowed university, and thus put a stop to the temptation to reduce medicine to a species of commercialism.

"The paper of Professor Thayer, of Johns Hopkins, on the teaching of internal medicine was most instructive. He called attention to the 'university plan' of teaching adopted at Johns Hopkins, which makes much of the course elective with the student, who is presumed to know where his deficiencies lie and where his greatest effort is needed."

The progressive abandonment of purely didactic teaching to give larger place for the more valuable practical instruction at the bedside and at the necropsy is mentioned as another important feature of this paper. Allusion was also made to the merits of the method of teaching represented by "discussion," which has for two years been practiced in the Naval Medical School. At Johns Hopkins this factor in the conduct of medical education is observed in the following manner: "The case is studied, the diagnosis is written on the board by a member of the class, the necropsy is made to establish or disestablish the diagnosis, and the errors found are made matters of discussion at the next meeting. Thus the formal delivery of lectures and instruction in classes is much on the decline."

In concluding Doctor Wise asks the attention of the Bureau to the desirability that the Army and Navy Medical schools be represented in this association. And he goes on to say, "two such schools, teaching medicine and supported by the General Government, can exercise a large influence in the work of this organization, which is ultimately to raise the standard of medicine and the status of the profession to the plane which all concede it should occupy. Such representation will not only subserve the general good, but make it more practicable to fill the vacancies in the Medical Corps by competent men."

COUNCIL ON MEDICAL EDUCATION OF THE AMERICAN MEDICAL ASSOCIATION.

Asst. Surg. N. T. McLean, U. S. Navy, who represented the Medical Corps of the Navy at the "Third Annual Conference" of this council in Chicago April 29, 1907, reviews the points of interest in its work as follows:

"During the past year the members of the council have personally visited the medical schools of the United States for the purpose of

obtaining accurate information as to the actual work in progress at each individual institution. Their reports include the result of these visits, together with information as to requirements for matriculation, attendance, graduation, etc.

"As the result of this work 44 medical colleges of the country have adopted the requirement for admission of at least one year in a college of arts, to be devoted to physics, chemistry, biology, and one language, this requirement to become effective January 1, 1910.

"The council has classified the colleges of the country into three groups from the excellence of the course of instructions they offer and the requirements for graduation, viz: First, those above 70 per cent; second, those between 70 and 50 per cent; third, those below 50 per cent. One hundred per cent to represent an ideal course. They recommend that those in group 1 be recognized as reputable medical colleges, those in group 2 be required to strengthen their course before such recognition be accorded them, those in group 3 be not recognized as reputable medical colleges.

"It was hoped by the council that this information when given to the various State examining boards and supplemented annually by additional reports might enable the latter to arrive at a definite conclusion as to whether or not any given college ought to be accepted by them as reputable.

"While the council has no legal standing, they possess considerable power as the representative of the American Medical Association. They confer with the various State examining boards and furnish these boards with information as to the colleges. Therefore it will be readily appreaciated that the colleges are not, as a rule, indifferent to suggestions made by this council.

"In addition to this work the regular work of publication of State board examination statistics, statistics regarding medical students and graduates, and keeping record of the changes in medical practice acts and reciprocity has been kept up.

"In the coming year they hope in addition to a continuance of the above to secure: (*a*) Through State examining boards higher standards in medical practice acts, in order to support the 44 medical schools which have voluntarily raised their requirement of preliminary education to one or more years' work in a college of arts. (*b*) Completion of a scheme for the systematic inspection of medical schools in cooperation with State examining boards. This will probably include the inspection of colleges of liberal arts which request advanced standing in medicine for their graduates. (*c*) The securing of a list of standard high schools of the United States.

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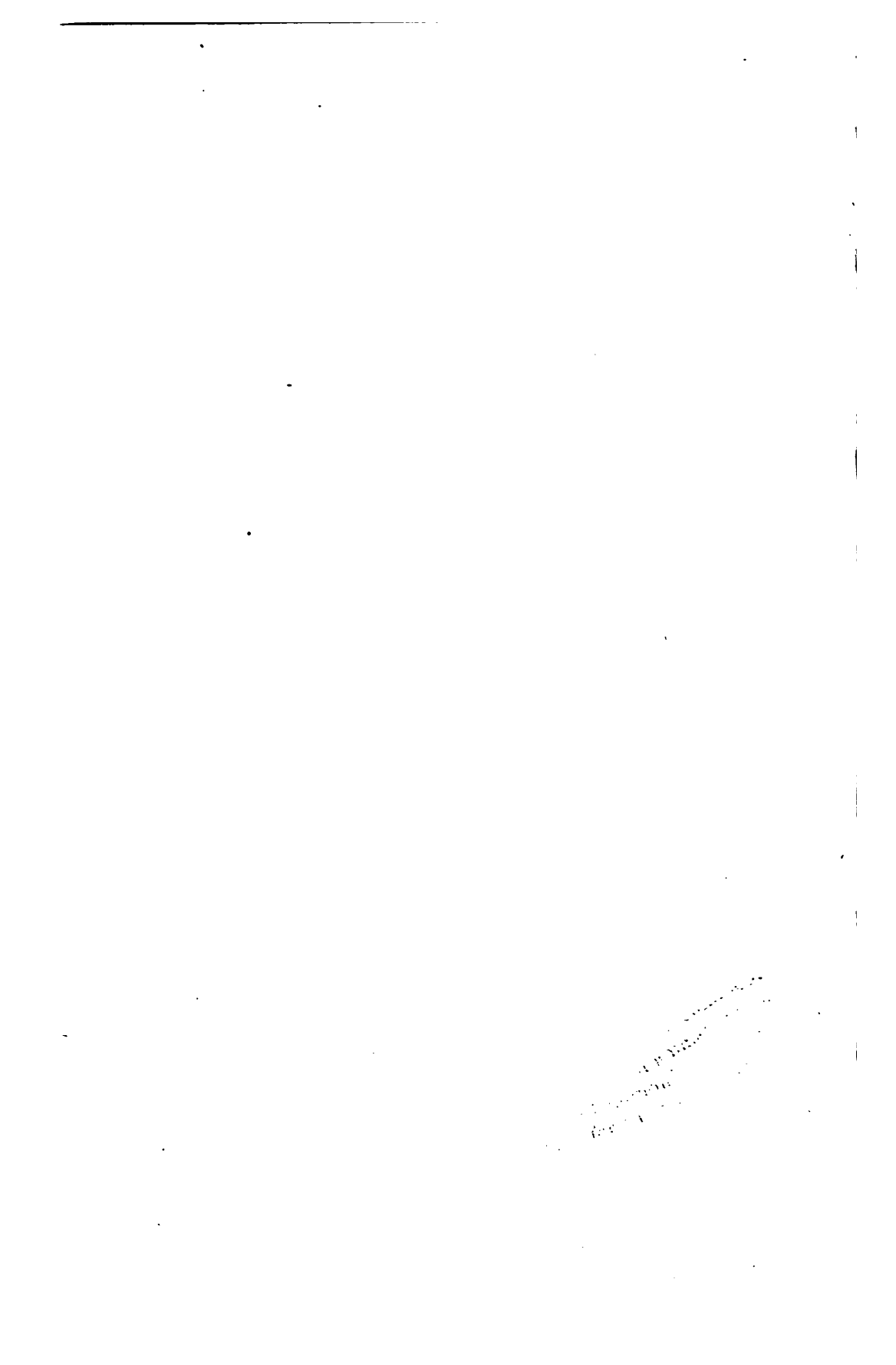
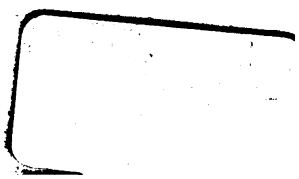
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